

UNIVERSITY OF ALBERTA LIBRARY

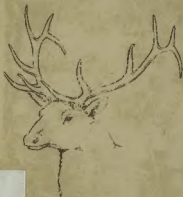


0 0000 8160 491

# The Eastern Rockies and Western Plains of Canada

BY

A. L. RAND



QL

721

R186

C. 7

SCI

NATIONAL MUSEUM OF CANADA  
OTTAWA

EX LIBRIS  
UNIVERSITATIS  
ABERTHAESIS







CANADA  
DEPARTMENT OF MINES AND RESOURCES  
MINES AND GEOLOGY BRANCH

---

QL  
721  
R186  
C7

NATIONAL MUSEUM OF CANADA

BULLETIN No. 108

Zoological Series No. 36

MAMMALS OF THE EASTERN ROCKIES  
AND WESTERN PLAINS OF CANADA

BY  
A. L. Rand



---

OTTAWA  
EDMOND CLOUTIER, C.M.G., B.A., L.P.S.,  
KING'S PRINTER AND CONTROLLER OF STATIONERY  
1948

*Price, 50 cents*

51701-14

LIBRARY OF THE UNIVERSITY  
OF ALBERTA

# CONTENTS

	PAGE
Introduction.....	1
Area.....	2
Topography.....	3
Climate.....	5
Vegetation.....	6
Mammals.....	10
Distribution.....	10
Habitats.....	16
Changes in mammal life.....	18
Cyclic changes.....	20
Season by season.....	22
Feeding.....	24
Reproduction.....	26
Importance to man.....	31
Fur.....	33
Mammal study.....	35
Systematic section.....	38
Synopsis of the orders of Alberta mammals.....	42
Order—Insectivora, insect eaters.....	45
Order—Chiroptera, bats.....	53
Order—Carnivora, carnivores.....	65
Order—Rodentia, rodents.....	123
Order—Lagomorpha, rabbits and hares.....	159
Order—Artiodactyla, cloven-hoofed animals.....	203
References.....	223
Index.....	227

## Illustrations<sup>1</sup>

Figure	1. Head of Canada lynx.....	Frontispiece
	2. Map of Alberta.....	4
	3. The plains of southern Alberta, near Macleod.....	6
	4. The acid, short-grass prairie near Lost River in southeast Alberta.....	7
	5. The valley of Milk River, west of Wildhorse.....	7

<sup>1</sup>Photographs from the files of the National Museum.

180564

## Illustrations—Continued

	PAGE
Figure 6. The Rocky Mountains in western Alberta.....	8
7. Forest, brush, and lake country in central Alberta near Belvedere.....	9
8. Spruce forests, barren rocky ridges, and lakes of northern Alberta.....	9
9. Map showing the present ranges of three species of Canadian mammals that have very different types of distribution.....	11
10. Life zones of Canada (from Anderson 1938).....	14
11. Map showing the progressive reduction of the range of the bison.....	17
12. Chart showing the lynx take in Canada.....	20
13. The weasel changes its coat with the season to match its background.....	22
14. Diagram showing food of skunk.....	24
15. Young of the meadow mouse.....	27
16. Young of the snowshoe rabbit.....	28
17. Pack-trains such as these carry the sportsman into remote areas in search of big game.....	30
18. Diagram of some indirect ecological relationships between the fisher and the yellow pine.....	31
19. Cabins in which trappers spend the winter.....	32
20. Some of the mammal specimen cases in the National Museum.....	34
21. A white-footed mouse skin pinned out to dry.....	35
22. A Museum special mouse trap set at the end of a hollow log.....	36
23. Wing (a) and skull (b) of a big brown bat.....	41
24. Head and skull of a cinereus shrew.....	42
25. Wolverine skull.....	42
26. (a) Rodent skull (woodchuck); and (b) head of another rodent.....	43
27. Skull of a lemming (snowshoe rabbit).....	43
28. Skull of a Virginia deer.....	44
29. Skulls of various shrews.....	47
30. Cinereus shrew.....	48
31. Hind foot of water shrew.....	53
32. Some Alberta bats and shrews.....	56
33. Heads of various bats, showing ear shapes.....	57
34. Little brown bat at rest.....	57
35. Tail, right hind foot, and part of intertemporal membrane of (left) long-legged bat; and (right) little brown bat.....	61
36. Black bear skull.....	67
37. Raccoon skull.....	67
38. Mink skull.....	68
39. Wolf skull.....	69
40. Cougar skull.....	69
41. Head of black bear.....	70
42. Black bear.....	71



## Illustrations—Concluded

	PAGE
Figure 43. Two black bears playing in a tree near Jasper.....	72
44. Feet of black bear.....	73
45. Grizzly bear, showing hump over shoulder.....	74
46. Raccoon studies, head and tail.....	77
47. Raccoon feet.....	78
48. Heads of marten and mink.....	81
49. Marten.....	82
50. Marten paws.....	83
51. Fisher.....	85
52. Weasels.....	87
53. Mink.....	91
54. Black-footed ferret.....	93
55. Wolverine.....	95
56. Otter.....	96
57. Skunk.....	99
58. Badger head.....	101
59. Badger feet.....	102
60. Coloured or red fox.....	105
61. Wolf.....	113
62. Diagram of hind foot of wolf (left) and cougar.....	114
63. Cougar head.....	116
64. Lynx.....	120
65. Tail of lynx (upper) and tail of bob cat.....	122
66. Alberta squirrels and relatives.....	126
67. Skull of Columbian ground squirrel.....	132
68. Feet of thirteen-lined ground squirrel.....	138
69. Feet of red squirrel.....	145
70. Pocket gopher.....	150
71. Head of kangaroo rat.....	151
72. Beaver.....	154
73. (a) White-footed mouse, and (b) meadow mouse...	156
74. Some Alberta mice.....	156
75. Skull of white-footed mouse and deer mouse.....	161
76. Bushy-tailed wood rat.....	162
77. Enamel pattern of molars.....	166
78. Grooved upper incisors of bog lemming.....	167
79. Left front foot of brown lemming.....	168
80. Dorsal view of skulls.....	171
81. Muskrat.....	181
82. Upper molars of: (a) white-footed mouse; and (b) house rat.....	184
83. Jumping mouse.....	187
84. Skulls of two species of jumping mouse.....	188
85. Canada porcupine.....	192
86. (a) White-tailed jack rabbit; (b) snowshoe rabbit; (c) cottontail rabbit; (d) pika.....	194
87. Some big game mammals.....	204
88. Pronghorn antelope.....	216
89. Ruler, comparing metric and English systems of measuring.....	Inside of back cover





Figure 1. Head of Canada Lynx.



## MAMMALS OF THE EASTERN ROCKIES AND WESTERN PLAINS OF CANADA

### INTRODUCTION

The eastern slopes of the Rocky Mountains and the western plains that spread eastward from them are especially rich in mammals, large and small. In this area, the Dominion of Canada has established several National Parks on the eastern slopes of the Rocky Mountains—Jasper Banff and Waterton Lakes for the preservation of wildlife and, these parks are popular resorts for visitors. On the plains in the south is Vermilion National Park, established for the preservation of antelope near Edmonton, there is Elk Island National Park, and in the north is Wood Buffalo Park.

The importance of the mammals in these parks to the local residents and to visitors makes an inventory essential and this volume was written to supply a guide to the mammals, their identification, and something about their way of life. The area outlined by these parks so nearly outlines the area of Alberta that the limits of that province were chosen as arbitrary geographical limits for the work.

Other mammals are our closest relatives (for we too, are mammals) and we have a natural curiosity about our relatives. A knowledge of the wildlife of our forests and plains adds interest to and appreciation of our outdoors. Its study has a recreational value as well as a cultural value and a knowledge of our wildlife and its relationships has a practical value. We must live with our neighbours; some must be controlled, some encouraged. Some have a value as objects of sport, some are a source of revenue as fur, and some devour what we want to eat. Conservation, the wise use of our resources, should be

based on knowledge. For practical reasons we must know more about our mammals as well as for the reason that ignorance is dangerous.

Sometimes such as this are based on the work of many individuals who have already laboured in the field and this is no exception. A profound debt of gratitude is acknowledged to the many who were able to contribute knowledge. Helms, for example, has found almost the distribution in the mammals of Canada. Paul Simmons, a mammalogist, has data for northern Alberta in 1908 when four such workers as Helms and Connor gave us the big mammals of the Rocky Mountains and Cooper has given us accounts of various areas from the mountains to the southern border. Many taxonomists and all groups have given details of variation in variation. A person is always going to be ignorant of his knowledge of the distribution of mammals in this area.

Many studies have given us a picture of the way of life of our mammals. Many of these were recorded, perhaps our own, and though perhaps can only be tentatively accepted for the area until it is known that the mammals of behavior, food and breeding are actually in error.

In preparing this account the work of others has been heavily drawn on and the author acknowledges his debts in many cases. Personal experience has been added to the sources of field work in the southern part of the province. For an acknowledgment must be made to R. M. Anderson, formerly Chief of Division of Biology, National Museum of Canada, whose cooperation and advice has been of inestimable value to C. E. Johnson of the National Museum who has arranged most of the drawings and to R. W. Hawkings of the National Museum who prepared the map and did some of the diagrams.

## AREA

Alberta extends from the Montana border of the United States (north latitude 49 degrees) north to the Northwest Territories (MacKenzie) (north latitude 60 degrees) a distance of 660 miles and from the Saskatchewan



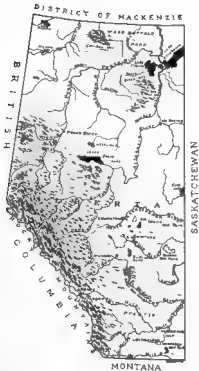


Figure 1 Map of Alberta



During recent glacial periods most of Alberta east of the Rocky Mountains (the interior plain) was probably covered with ice, parts of the Rockies and probably the top of the Cypress Hills escaped glaciation.

#### *References*

Canada Year Book, and M. Y. Williams. 1926. Trans. Roy. Soc. Canada. 3rd ser., vol. 22, sec. 4 pp. 41-79.

## CLIMATE

In Alberta the normal winter is cold, and in some years extreme cold periods from November to March, but in other years the chinook wind dominates the winter warm days with bright sunshine frequently occurring.

In summer the isotherms run nearly north and south so that the mean summer temperature is almost as high in the north as in the south. April average daily maxima are 53 degrees<sup>1</sup> at Calgary and Edmonton, and 58 degrees at Medicine Hat. The temperature curve rises rapidly in April, May and June. Bright hot days are usual in July and August temperatures occasionally exceeding 90 degrees, and 100 degrees may be surpassed in the southern districts the average mean maxima are Medicine Hat 82 degrees, Calgary 75 degrees, and Edmonton 74 degrees.

Though the Peace River country (at Dunvegan and Lake Athabasca (at Fort Chipewyan) have about the same summer temperatures as Calgary and Edmonton, the temperature falls more quickly in the autumn noticeable by late August.

The winter from December to March, has average temperatures, distributed from north to south as follows: Calgary 18 degrees, Edmonton 14 degrees, Dunvegan 8 degrees, Chipewyan - 3 degrees.

The chinook wind usually blows from the southwest or west. It occurs more frequently in the south but is not uncommon as far north as the Peace River country. It can cause a rise in temperature from 20 to 40 degrees.

---

<sup>1</sup> Temperatures are in degrees Fahrenheit.

in a few hours. This wind is the chief reason the ground is usually bare of snow over large areas of the prairies of southern Alberta during the winter.

In extreme southern Alberta the average precipitation is less than .5 inches and is between 10 and 12 inches in places; the central part of Alberta receives an average of 15 to 21 inches of rainfall, and this decreases northward to about 11 inches at the northern border. The heaviest rainfall is in the extreme south at a station where 21 to 31 inches are recorded. About one half of the annual precipitation falls in June, July, and August.

#### References

Alberta: *Our Canada Year Book*, and *Agriculture, Climate and Population of the Prairie Provinces*, etc., Dominion Bureau of Statistics, Ottawa.



Figure 1. A typical view of southern Alberta, showing the silty area in the foreground, the flat land with the mountains in the background.

## VEGETATION

In extreme southern Alberta most of the foothills and south of a line running north-south from just north of Calgary is prairie with trees only along the rivers and one isolated forest on Cypress Hills on the foot of the Rocky Mountains are areas of Alpine grassland. The

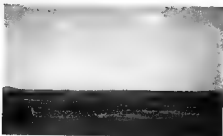


Figure 4. Field of low grass, as much as 100 ft. high, near the mouth of the Missouri River. This is a natural range along the river in the mid-western states. Sagebrush were common, and shrubs and pines were few. The dump of trees is about the headwaters of the Missouri Range Station.



Figure 5. The valley of the Missouri River west of Windward, an extreme southwest Alberta, in the background the Sweet Grass Hills in Montana show faintly.

northern part of the province, the mountain slopes, and foothills are largely covered with coniferous forests in which white spruce and jack pine are important components on the interior plains. The forests of the east slopes of the mountains are characterized by Engleman spruce, lodgepole pine, alpine fir near timberline, white-barked pine and in the south slope (Lynx) larch. Along the lower slopes in the southern part there is some Douglas fir.



Figure 6. The Rocky Mountains, a western Alberta, near the head of North Saskatchewan River, on the Jasper-Banff Highway

Though these forests are predominantly coniferous certain broad-leaf trees notably aspen, balsam poplar, black poplar and white birch occur, and in south-central Alberta where the coniferous forests gradually give way to grassland the poplars become the dominant trees.

In central and southern Alberta north to about Athabaska Landing, much agriculture has changed the vegetation cover giving wheat fields and grassland mixed with poplar groves in areas that were originally forest.

#### References

- Haunday 1937 A Forest Classification for Canada, Dept. Mines and Resources, Forest Service Bull. 26.  
Macoun and Macle 1916 Flora of Canada, Dominion of Canada, Year Book 1913-23.



Figure 7 Forest, brush and lake country in central Alberta near Redwater.



Figure 8 Spruce forests, barren rocky ridges, and lakes of northern Alberta.

## MAMMALS

## DISTRIBUTION

The present paper lists 85 species and 133 kinds (species and subspecies) of mammals, belonging to 20 families, as occurring in Alberta.

*Alberta Mammals*  
(Species included by groups)

	No. of species	No. of kinds (species and subspecies)
Sciuridae (squirrels)	8	6
Vesperatilionidae (bats)	2	12
Ursidae (bears)	2	2
Procyonidae (raccoons)	1	1
Mustelidae (weasels and their allies)	11	14
Canidae (wolves, dogs, etc.)	5	13
Felidae (cats, etc.)	2	2
Soridae (squirrels and their relatives)	2	20
Geomysidae (pocket gophers)	1	2
Heteromyidae (long-eared rats and pocket mice)	1	1
Castoridae (beaver)	1	2
Crinetidae (mice, voles, and rats)	15	25
Muridae (house rats and mice)	2	2
Xapodidae (jumping mice)	2	2
Erethizontidae (porcupines)	1	2
Ochotonidae (pikas)	1	2
Leporidae (rabbits and hares)	2	6
Cervidae (deer, etc.)	7	7
Artiodactylidae (pronghorn antelope)		1
Bovidae (cattle, etc.)	2	2
Total	85	133

Some occur, or did occur, widespread over the province, such as the wolf (*Canis lupus*), and white-footed mouse (*Peromyscus maniculatus*). Others are obviously limited by their habitat requirements: red squirrels (*Tamiasciurus hudsonicus*) to trees, beaver (*Castor canadensis*) to waterways, mountain goats (*Oreamnos americanus*) to cliffs, and jack rabbits (*Lepus townsendi*) to plains. But there is an historical background that has had its effects in determining what mammals reached the province.

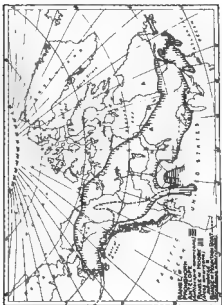


Figure 8 has shown the present ranges of three species of *C. and* in mammals that have in 3 different types of distribution the most, was open in the conditions forming the activity of the fauna and the goal of the month to later. Additionally,

Some time before the last ice age mammals were probably distributed in a broad band across Canada. With glaciation most of the area now known as Alberta was ice covered, and unsuitable for mammalian life. The mammal fauna retreated before the ice and survived in the forested areas in the east, in plains to the south, in forested and mountain areas to the west and southwest, and probably in the Alaska area.

With the retreat of the glaciers the area now known as Alberta was gradually populated from various directions.

The bulk of the forest fauna came from refuges in the east, part from the southwest, of which some is peculiar to the Rocky Mountains. From the plains to the south of the glacier came another element, and from the north came another small element.

The great bulk of the forested area is occupied by mammals, which presumably survived in eastern refuges and later pushed westward to occupy the broad transcontinental belt of coniferous forest. Typical of this assemblage are

Citellus shrew (*Sorex cinereus*)  
 Water shrew (*Sorex palustris*)  
 Saddle-backed shrew (*Sorex arcticus*)  
 Pigmy shrew (*Microsorex hoyi*)  
 Marten (*Martes americana*)  
 Fisher (*Martes pennsylvanica*)  
 Least weasel (*Mustela nivalis*)  
 Wolverine (*Gulo luscus*)  
 Lynx (*Lynx canadensis*)  
 Woodchuck (*Marmota monax*)  
 Northern flying squirrel (*Glaucomys sabrinus*)  
 Beaver (*Castor canadensis*)  
 Bog lemming (*Synaptomys borealis*)  
 Phenacomys vole (*Phenacomys intermedius*)  
 Red-backed mouse (*Clethrionomys gapperi*)  
 Varying hare (*Lepus americanus*)  
 Moose (*Alces americanus*)

During isolation by glaciation certain forms developed in the west or southwest and with the retreat of the glaciers these spread into the area. Many of the forms indicating this isolation are of only subspecies status, but the distribution of a few species indicates they follow this pattern.



The dusky shrew (*Sorex obsoletus*) is such a western form with an isolated population left on the Cypress Hills and a few populations farther east. Others are

Long-tailed meadow vole (*Microtus longicaudus*)  
 Western jumping mouse (*Zapus princeps*)  
 Mountain quonag (*Peromyscus montanus*)

There is a considerable western mountain element that is adapted to the mountains and an ecological factor as well as an historical background explains their restriction or near restriction to the mountains.

Hoary marmot (*Marmota caligata*)  
 Color-bear ground squirrel (*Citellus richardsoni*)  
 Mantled ground squirrel (*Citellus lateralis*)  
 Allen chipmunk (*Eutamias amoenus*)  
 Red-breasted chipmunk (*Eutamias ruber*)  
 Wood rat (*Neotoma crinita*)  
 Richardson vole (*Microtus richardsoni*)  
 Pika (*Ochotona princeps*)  
 Mountain sheep (*Ovis canadensis*)  
 Mountain goat (*Capra ibex americana*)

A considerable number of larger mammals that are now thought of as western but that formerly spread much farther east, and whose range was driven westward by the encroachment of civilization are

Cougar (*Felis concolor*)  
 Grizzly bear (*Ursus horribilis*)  
 Elk (*Cervus canadensis*)  
 Bison or buffalo (*Bison bison*)

Others, mainly western, still extend far east, such as

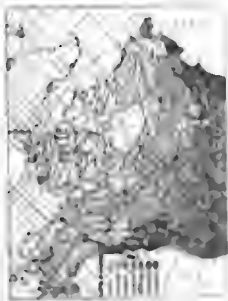
Coyote (*Canis latrans*)  
 Least chipmunk (*Eutamias minimus*)  
 Black-tailed deer (*Odocoileus hemionus*)

The Arctic area also has had an influence on the Alberta fauna. Certain species that probably had their origin in the northwest have spread into the northern or western part of the province such as

Brown lemming (*Lemmus trimaculatus*)  
 Chestnut-checked vole (*Microtus pennsylvanicus*)

From the barren grounds of the north migrants of two species come south in winter to extreme northern Alberta:

Barren-ground caribou (*Rangifer arcticus*)  
 Arctic fox (*Alopex lagopus*)



On the plains of the southern part of the province, and extending in some cases into the forest belt often with local restriction of local distribution are found such plains species as

Black-footed ferret (*Mustela nigripes*)  
 Badger (*Taxidea taxus*)  
 Kit fox (*Vulpes velox*)  
 Frank's ground squirrel (*Citellus franklini*)  
 H. L. F. ground squirrel (*Citellus richardsoni*)  
 Thimble-eared ground squirrel (*Citellus thomomys*)  
 Canyon rat (*Thomomys talpoides*)  
 Kangaroo rat (*Dipodomys deserti*)  
 Cottontail (*Dipodomys deserti*)  
 Lesser meadow mouse (*Dipodomys minor*)  
 Field vole (*Callospermum canadense*)  
 Water shrew (*Sorex palustris*)  
 Cotton-tail (*Lepus americanus*)  
 Prairie dog (*Cynomys ludovicianus*)

It is remarkable that the distribution of Canadian Alberta mammals with Merriam's life zone concepts has been summarized by Aspinall. As his summary affects Alberta he does not take account of the Hudsonian zone, the forest belt, or the Canadian zone and the plains in the Transition zone.

Although the mammals range is usually not higher than one zone as has been indicated previously others are more restricted and seldom restricted to only part of a zone either due to habitat requirements or because of historical reasons.

The Hudsonian zone in Alberta is poorly characterized by mammals. The following are the most nearly restricted to this zone.

Mountain caribou (*Rangifer montanus*)  
 Richardson vole (*Microtus richardsoni*)

The Canadian zone which includes all the main forested areas is characterized by a comparatively long list of species in Alberta such as

Cinereous shrew (*Sorex cinereus*)  
 Water shrew (*Sorex palustris*)  
 Marten (*Martes americana*)  
 Fisher (*Martes pennsylvanica*)  
 Lynx (*Lynx canadensis*)  
 Northern flying squirrel (*Glaucomys sabrinus*)

Red-backed mouse (*Peromyscus gambelii*)  
 Bushy rabbit (*Lepus americanus*)  
 Moose (*Alces americanus*)

The Transition zone in Alberta is generally characterized (now or formerly) by the presence of

Richardson ground squirrel (*Citellus richardsoni*)  
 Badger (*Taxidea taxus*)  
 Kit fox (*Vulpes velox*)  
 Jack rabbit (*Lepus texianus*)  
 Prairien skunk (*Arctomys americanus*)

#### HABITATS

Mammals within their range have special preferences as to the habitats in which they live. This often correlates with manner of feeding and structure. The pocket gopher is burrowing type with its strong forelegs and elongated claws for digging spends most of its time underground in tunnels. It makes ground squirrels woodchucks and many mice spend most of their active time on the surface of the ground but with underground dens to retire in for safety and sleep in winter and heavier (anophthalmic type), adapted for swimming find their favourite habitat in the water & along shores but find some mammals spend all their time on the surface of the ground (terrestrial) like the deer and the gopher some climb into the trees overhead as white footed mice flying squirrels and martens (fisher) and bats feed in the air (aerial).

Although the habitat of some mammals includes a wide variety of conditions as the coyote a running plains animal which also ranges in the forest and the porcupine a tree climbing animal that ranges through the forests and far out into the plains and the beaver and muskrat that live in waterways under a great variety of conditions many mammals are more selective. Red backed mice and tinamous and dusky shrews are largely restricted to damp forests short tailed meadow mice detour damper grassy areas and glades in parks of forests and forest meadow mice favour drier grassland the pair of mice even goes into the sage bush field water shrews are restricted to the edges of waterways in or near the forests Richardson vole to aquatic streams pocket gophers are locally dis-

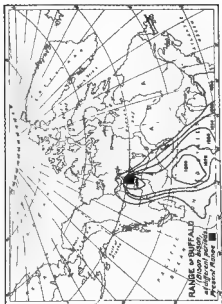


Figure 11 Map showing the present or reduction of the range of the bison which was the direct result of bison extermination, after Anderson (1900)

located in open country where soil is suitable for burrowing. pikas and wood rats as well as masked ground squirrels need the shelter of rocks for their existence. mountain goats need the security of cliffs to which to retreat for safety and prong-horn antelope depending on speed for safety live on the open plains.

In any case a close study of the mammals will show that rarely do two species living in that area have the same habitat requirements. There are a few apparent exceptions: the two species of porcupines and muskrats; the two meadow voles (the long-tailed and the short-tailed); and the two deer (white-tailed and black-tailed); and the ground squirrels in some areas. A study of their relationships where this occurs would repay effort.

#### CHANGES IN MAMMAL LIFE

In the middle part of the last century great herds of buffalo roamed the plains and great caribou herds that have disappeared roamed the forest trunks. An eagle never appeared at the beginning of the century but have now increased in numbers and have disappeared over much of their original range though at a distance in the mountains. Some of the most important fur-bearing the beaver, marten and fisher whose pelts used to rank large in the fur trade have been over-trapped until cheap furs have taken their place. Wolves have completely disappeared from the southern plains and the kit fox is almost gone.

Though we regret the necessity some of these changes were necessary. Buffalo herds and wheat fields no longer and cattle just couldn't get along together but in Alberta most mammals are still well represented and there is space for them. The fisher, lynx and kit fox are still in a precarious situation however the first two being on the verge of commercial extinction and the latter nearly exterminated. The Government of Alberta with its new game laws preserved areas and superintendents and the Dominion Government with its national parks ensure that we will always have enough of most mammals in the province. The national parks that are havens for wildlife and attractive because of the abundance of big mammals that may be seen are as follows.

### *National Parks in Alberta*

The following data are largely from the *Canada Year Book*, 1945, pp. 30-33.

**Banff** in western Alberta on the east slope of the Rockies established in 1885 area 2,365 square miles a typical example of the central Rockies with massive ranges, ice-free alpine valleys glacier-fed lakes and hot mineral springs.

**Waterton Lakes** in extreme southwestern Alberta, adjoining Glacier Park in Montana (U.S.A.) established in 1895 area 220 square miles.

**Jasper** in western Alberta on the east slope of the Rockies established in 1907 area 4,200 square miles immense region of majestic peaks, deep canyons and beautiful lakes.

**Buffalo** National Park in eastern Alberta near Wainwright established in 1908 area 197.50 square miles fenced area originally set aside for the preservation of buffalo and other big game. Animals, especially in winter with drums as a stimulus, utilized by the Department of National Defence for war purposes.

**Elk Island National Park** in central Alberta near Lacombe established in 1913 (reserved in 1906) area 51.20 square miles fenced preserve containing a large herd of plains bison also numerous deer, elk and moose.

**Senakani National Park** in southern Alberta near Foremost established in 1922 area 8.50 square miles a fenced preserve established to protect pronghorn antelope.

**Wood Buffalo National Park** partly in Alberta (13,675 square miles) and partly in Northwest Territories (3,625 square miles) established in 1922 area 17,300 square miles approximately one-third covered by forests and open plains dotted with lakes and with numerous streams and rivers. Contains a large herd of buffalo developed from the native woodland type and surplus plains buffalo from Buffalo National Park as well as bear, beaver, caribou, deer, moose and waterfowl, area as yet undeveloped. There is a good faunal account of this park. See Soper 1942 *Mammals of Wood Buffalo Park, etc. Jour. Mammal.*, vol. 23, pp. 119-145.

## References

- Hewitt, C. G. The Conservation of the Wild Life of Canada, Charles Scribner's Sons, 1921.
- Allen, G. M. Extinct and Vanishing Mammals of the Western Hemisphere, Amer. Committee for International Wildlife Protection, Special Publication, No. 12.

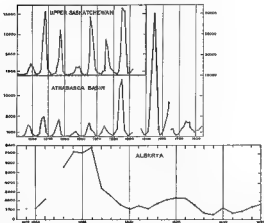


Figure 12. Chart showing the lynx take in Canada. Illustrating the amazing regularity of the lynx cycles in Canada (a and b from Elton, and c showing the lynx take in Alberta, 1919-39 to 1943-44). Though the recent lynx take is very low, it still tends to fluctuate over a cycle of about 10 years.

## CYCLIC CHANGES

All the changes in mammal populations from year to year are not the results of human activities. Best known of these perhaps are the cyclic changes in the snowshoe rabbit and the correlated cycle of the lynx.



Thanks to the early work of Nelson and Hewitt and the later surveys of Pitelka and his co-workers at the Bureau of Animal Population (Oxford) and the National Parks Bureau (Ottawa) we know that snowshoe rabbits tend to fluctuate regularly with a period of about 10 years between the population peaks when they are most abundant. The lynx which preys on the snowshoe rabbit for food usually have similar fluctuations but in recent years its numbers have been so reduced that the fluctuations are less evident.

Many other mammals also fluctuate in numbers as the house martin, fox and muskrat with a regularity that indicates a cycle of about 10 years but there is some evidence that these are local affairs as yet than with widespread cycles as those mentioned in the preceding paragraph. It may be pointed out here that these fluctuations are seen now, for example, the muskrat shows that in the north and the south of western Canada there have been periods when about half the population died.

Smaller mammals also have their fluctuations. There is little Alberta data but from extralimital information we can get the idea that the small rodents such as the meadow mouse will be found to fluctuate on a 4 year cycle and shrews may do the same; squirrels may be found to fluctuate on a cycle of about 7 years. Wolves also fluctuate over long periods.

In a few cases as the lynx cycle following that of its prey species the snowshoe rabbit there seems to be a direct cause and effect.

But the fundamental causes of these cyclic changes in abundance is obscure. Pitelka suggests an external controlling climatic factor; there is also the theory of a prey-predator relationship that must be considered. When the prey species is abundant the predators increase until they cause a decline in the prey species and later with less abundant food the predators decline in numbers allowing the prey species to increase. Then must be considered the theory that populations build up to a critical level after which they decline suddenly, due to population factors, such as exhaustion of food and abnormal opportunities for the spread of epidemics when the critical level is reached.

## References

- Voles, Mice, and Lemmings, by Charles Elton Oxford, 1942 and the very important review of this volume by G Evelyn Hutchinson in the Quarterly Review of Biology for December 1942
- MacLulich D A 1937 Univ Toronto Biol Series No. 43. 136 pp (illustrations)
- Cross, 1940 'Four Mammals', 31 pp. 294-306 (criticism of certain views on fluctuation)

## SEASON BY SEASON

With the great change from summer to winter in Alberta mammals must meet drastically changed conditions. With some her the matter is little more than a compaction of the moult and a resultant thicker coat, but with others there are additional adaptations. Some of the bats, like the hoary and red bats, flee the country, migrating to warmer climates for the winter and returning in the



Figure 13 The weasel changes its coat with the season to match its background: in summer the pelage is brown (left), and in winter the weasel molts into a white pelage (right)

spring. Many other mammals make seasonal movements of lesser extent, movements that are so short they have hardly merited the term migration, though that is what they are. In the extreme north barren-ground caribou come into the province, migrating from the north, to spend the winter, some of the hoofed animals, the black-tailed deer, elk, and sheep that spend the summer solitary or in small bands at high altitudes in the mountains come to our lower altitudes and gather into larger bands in the autumn, the

pronghorn antelope gathers from its scattered range into smaller favoured areas, some in the Wildhorse area, others in the Saffield area.

Other species that stay in the same locality for the winter meet it in different ways, the marmots, woodchucks, ground squirrels, jumping mice, bears and some bats go into the profound winter sleep of hibernation. Some store food like the pikas with their haystacks and the chipmunks which are little active during the winter with their stores of seeds. The red squirrels, too, though active during the winter except in most severe weather, also stores cones and berries. Some carnivores like the mink also make caches of food.

The snowshoe rabbit, which is exposed to predators all winter, moults into a white coat in the autumn, and in the spring moults back into a brown coat, harmonizing with the snow in winter and the snowless landscape in summer. Though there may be short periods spring and autumn when it is conspicuous as when it turns white before the snowfall. Not only do prey species turn white in winter, for all three of the carnivorous weasels also moult into a white winter coat and again moult into a brown summer one.

The food of many species changes, the porcupine feeds on much herbaceous material in the summer, and in winter must rely on bark of trees. The forest and bushland rabbits that feed on succulent herbs and grasses in the summer must turn to twigs and bark and leaves of conifers in winter. The foxes that eat many insects in the summer must turn more to a mammal diet in winter when the snow covers the land so that meadow mice are hidden. It must turn to rabbits or other food. Probably most species make drastic changes in their lives to meet winter.

### *References*

- Bacon, E. T. Life Histories of Northern Animals, Charles Scribner's Sons, 1939 (2 volumes)  
 Lives of Game Animals, Doubleday, Page and Co., vols. 1-4, 1925-1928 (and later editions)

## FEEDING

What mammals eat is correlated with where they live, and with their equipment for getting food, and probably with an inherited taste for certain items. From an examination of the teeth of an animal one could make a reasonable deduction as to its general food: the sharp, pointed teeth of shrews and bats for insect eating, the fangs of carnivores

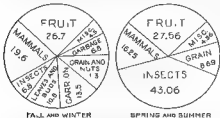


Figure 1. Diagram showing food of shrews, in summer when insects are important, and in winter when insects are less important, in *S. des.* Figures indicate percentages of each item. (New York data from Hamilton.)

for flesh eating, the gnawing teeth of rodents for cutting vegetation, and their grinding cheek teeth for chewing it, the lack of upper incisors in hoofed mammals (ungulates) and their grinding cheek teeth for browsing and grazing.

Most shrews run about on the ground to get their insect and other small animal food, the water shrew hunts in the water, bats fly about in the air overhead and take their insect food on the wing. Shrews also eat seeds, and Criddle suggests that in winter seeds may be an important food. The bears and raccoons, though carnivores, have a generalized diet and eat much vegetable food. It has been said of the bears that although they have a taste for flesh, they are unable to catch enough to feed themselves, and so eat carrion, what few mammals

they can catch and vegetation as a second choice. This generalities, not is reflected in the character of their cheek teeth, which are bent up to be crushing than food rather than more sharp edged or cutting flesh. The upper and their contraries, mandible shorter and lower marginally depressed and the mandible is long, stiff with agility on the ground and the head is not supported by the neck. But the trunk is relatively a very square and the other animals are more elongated however. Pseudomys rats many times and the budget against ground animals.

The mouse catches and takes when stimulated for running and jumping. It is not a fast runner as a rodent also, but it is not as slow as a rabbit and jumping. The catch such as the wildcat suddenly hunt by stealth creeping on their prey or waiting for it to appear and pouncing on it.

The growing animals rodents and rabbits eat grass fruits and leaves twigs and bark. Some such as the chipmunk specialize in seeds. Others such as the meadow mouse special in herbaceous material. The cottontail rabbit feeds extensively on the leaves of cypresses, the porcupine at times at least feeds largely on the bark of trees. Some small grass mice be attracted to flowers that it eats leaving trees to get the twigs and small branches for food. Though the growing animals prefer largely on food of vegetable origin many of them have a taste for animal food. Many of the grass-eating species and as a rule, the grasshopper mouse feeds largely on animal food. Many of these grass eating animals eat the flesh. In the mammals such as the chipmunk and squirrels and flying squirrels some species to meat but in large rabbits give up to people to make at the flesh of other rabbits that have been run over by motor traffic and many of the mice will devour other flesh as the small mammal trigger discover when he finds his catch partly eaten in his traps.

The forest animals have two main types of feeding, by grazing on herbaceous plants as do the antelope and sheep and by browsing as do goats and moose. The herbage is taken into the mouth and broken off against the lower teeth by an upward movement of the head. The

mouse has a modification of the grazing habit, wading deep into the water and submerging its head to get aquatic plants.

Some mammals depend on plants for food, others depend on other animals that in turn depend on plants. Sometimes plant eaters increase so that they threaten to destroy their food, sometimes the meat eaters become abundant. There was never a balance, but rather a slow pendulum swing until man. With the advent of man and the supplying of maning food supplies, as wheat for ground squirrels, cattle for wolves, and turkeys for coyotes, naturalistic imbalances were added, and with settlement and man's hunting pressure the original conditions were still further upset.

Food habits of mammals must be taken into account in conservation measures and, as they may vary from locality to locality local studies are necessary. Fox are available for Alberta. The results of careful studies are sometimes strikingly at variance with local opinion, as Crows studies in weasels in Mintoona. Weasels have a notorious reputation as robbers of hen houses and, yet Crodies studies showed they killed few fowls, but did good service by killing rats and other rodents.

#### References

See under preceding section.

#### REPRODUCTION

The mating season of the elk starts in the autumn with the first frosts, when the bull elk come down from the mountains to gather their harems and carry on their polygamous mating. There is baying of challenges and fights over harems.

Many of our mammals are probably polygamous or promiscuous in their mating and the males have no part in the family life though the details of mating are little known in the smaller forms. There are some exceptions, notably with the wolves, where mating is monogamous, and in which the male takes part in the care of the young, bringing food to the den.







Larger mammals with long gestation periods have only one litter a year as do deer, pronghorn, moose, and woodchucks. Bears usually have young only once every 2 years. Some of the smaller mammals with short gestation periods have several litters a year as quark, muskrat, and muskox have and red backed muskrat. Sometimes I have taken up to a dozen separate samples of pronghorn or other animal age groups corresponding to various litters born during the year.

The number of young born varies from one in some forms as the beaver, muskrat or muskrat, to several as coyotes, chowies, and some mice.

The young of mammals at their birth are very small and the larger mammals generally have well developed young. The young of some mammals are able to follow their parents when they are born. The young of muskrat and quark mammals are poor swimmers and also of this type. The young of muskrat mammals are born in a very small sized form which is small and unable to follow much more than walk as well as swim. Bears and red backed muskrat.

The parents care for the young immediately with their mothers at birth. The mother generally and the male of some mammals take no part. Some mice make small nests of dead grass, underground or under some shelter. Some are nesting burrows for muskrats and wood chucks use their dens.

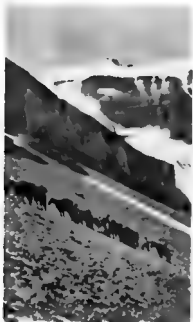
All the young mammals are dependent on their mothers for milk and are dependent on the early days of their lives.

The milk of mammals feeding vegetation in some species like muskrats and beaver they begin to eat some such as deer. The young get their first food by themselves while carrying on about eating vegetation. The early food is not brought to them by the parent. We must of our mammals is not the female that cares for the young but is some as the female the male helps care for the young and brings food.

The young mammals the young groups break up by no time but in a few as in the beaver the young remain with the mother for a year or more.

## References

See under preceding section



Fast  
into female holes on search of big game

## IMPORTANCE TO MAN

The mammals of Alberta have various and complex relationships to the residents of the province.

The fur bearers yield a substantial income to the province; meat-producing animals provide food for many wilderness dwellers, and others, beaver as trapping con-

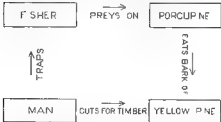


Figure 3. Diagram of some of the ecological relationships between the fishes and mammals of Alberta (from Hall 1942). Porcupines are accused of eating yellow pine. Man by trapping fishes removes one of the natural checks on porcupines.

serve water are at times an aid to man's activities, the big game furnishes hunting and thus recreation for a part of the people. The presence of mammals of interest to living in the country and the large mammals particularly are an attraction to visitors both in sightseeing and in hunting, whose value is hard to assess. Some mammals benefit us by eating insect pests.

The mammal population also causes damage. Bears and coyotes (and formerly wolves) destroy stock; wolves and cougars kill big game, smaller predators kill small game, moose and other large game hurt deer and elk; elk eat stacked hay, rabbits deer ground squirrels and pocket gophers eat garden stuff; ground squirrels (gophers of the ranchers) must be controlled on grain fields; bears damage canals and wood rats may so befoul them as to

make them more habitable. Fire may cut out forest-alls in barrens. Beavers may flow rivers and on the plains may eat shrubs, trees, and shrubs may be, are earth signs and signs of life are perceived and cut grass are and cause annoyance by growing camp buildings and equipment. Some animals may carry diseases that are transmittable to humans.



Figure 10. The animals upon the mountain range in the forest made by the mountain range in the forest.

And beneath all this is a web of interdependence that makes it impossible to neglect the complex extermination of any one or even several.

The more and the more are the first stage in turning vegetation into flesh for a few of the carnivores some of which are suitable in terms of the destruction of carnivores might result in the great increase of grass eaters a few great increase in some of the small rodents might result in the increase of some insect pests.

Larger carnivores have few friends. If there is the classical argument that by preying on the weak and the

until they have benefited the prey species by improving the quality of the stock. Lower mammal predation on game must be balanced against human predation on game. Without either a game species might increase until it was so plentiful it would eat all available food, and then with the range ruined, it could support few game animals, the rest dying of starvation.

#### Reference

Economic Mammalogy by Henderson and Craig Charles C. Thomas  
1933

#### FUR

The fur trade is such an important item that it is advisable to tabulate separately its data.

The returns of the fur centers of Alberta as given by the province of Alberta annual report for the year ended March 31, 1944, are

#### Alberta Fur Production (Season July 1, 1943 to June 30, 1944)

kind	Total number of pelts	Average value per pelt	Total value of pelts
Badger	6,031	\$ 3.43	\$ 20,786.93
Bear	151	4.90	739.90
Beaver	5,368	34.41	184,822.48
Ermine	191,453	2.37	451,721.61
Fox (other than red)	27,888	26.60	741,760.80
Fox (red)	3,445	14.63	50,393.35
Lynx	1,454	48.09	70,028.66
Marten	663	35.96	23,743.48
Mink	75,188	20.68	1,554,384.64
Muskrat	225,681	2.12	478,441.72
Otter	513	28.26	14,507.38
Rabbit	209,713	0.08	16,917.04
Skunk	28,680	3.94	113,339.20
Squirrel	687,039	0.60	412,223.40
Wolf (coyote)	31,058	16.38	508,418.06
Wolf (number)	723	15.08	10,902.24
Wolverine	50	15.60	780.00
Fish	135	1.30	175.50
Fisher	15	53.53	802.95
Wildcat	10	2.00	20.00
	1,512,627		4,657,506.02



**Fig. 200.** Author (second from left) in the main hall of the Natural Museum showing him the objects also shown in Fig. 194. The group at the party opened Fig. 1. The left side used for comparative reference.

For a discussion of the fur trade in Canada See "The Fur Trade in Canada" by H. A. Innis 1930 and for yearly take See mimeographed releases from the Dominion Bureau of Statistics, Ottawa

#### MAMMAL STUDY

The first step in mammal study is recognizing the different kinds of mammals and this is one of the main objects of this volume. Usually there is little doubt as to what group an animal belongs to whether it is a bear, fox, or deer. But there is the possibility of confusing a squirrel with a mouse. On page 40 is given a synopsis of the orders of mammals, with reference to the families into which the orders are divided and where keys to the species may be found.

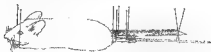


Figure 21 A white-footed mouse skin pinned out on a dry

Colour and external characters will serve to identify many of the larger and the diurnal mammals. But the casual observer will see few of the many small mammals in an area, and the brief glimpse he may catch will not serve for identification.

For knowledge of the small mammals of an area, trapping must be resorted to. If one is interested in catching the animals alive and keeping them in clean, comfortable quarters, box traps may be used.

For identification, spring mouse traps may be used, and the specimens' skins and skulls (for the skull is often more important than the skin in identifying small mammals) preserved. The National Museum has a pamphlet

"Instructions for Preserving Animal Specimens for Scientific Purposes," by R. M. Anderson, giving instructions on preparing specimens.





keeping track of the number of traps set and the number of individuals taken an index of abundance is obtained from comparison with their localities and other years. A convenient index is the number of individuals taken per 100 trap-nights, a trap night being one trap set one night, or trap set for 100 nights, or 100 traps set for 1 night, or 50 traps for 2 nights equals 100 trap-nights. Examination of the pelage gives data on food and external parasites of cheek pouches and alimentary tract, data on food and internal parasites, examination of the ovaries of females gives data on the time of breeding and the number of young.

On diurnal animals, and on animals in captivity, observations can be made that will add much to our knowledge.

In a field like this no one can cover every detail, and the notes of many persons are needed for working out complete life histories of any species even the commonest. A young observer may find out something that was not known before and in casual phrase add something to the sum total of human knowledge. (Anderson)

An outline as a guide is important to indicate points to be looked for. The following is adapted from Dr. Anderson's article on mammal study in the Canadian Field-Naturalist 1919, vol. 33, pp. 86-90 as a preliminary guide.

Present and former status including estimates and counts of numbers of mammals, fluctuations in numbers from year to year and causes.

Means of detecting presence including tracks, feces, claw marks on trees, tooth marks on bones, wallows, nests, cuttings.

Habitat relations including preference for soil, water, vegetation of different kinds.

Interrelationship of species including friends, enemies, offense or escape, competition between closely related species.

Times of daily activity including time of starting and ending activities, relation of this to weather.

Migration and hibernation including dates of appearance and disappearance and relation of this to weather, direction of migration and place of hibernation.

Movements including mode of travel, speed, direction, enclosure.

Voice and other means of intercommunication including notes, their description and meaning, visual signals, odor.

Social organization including formation of bands or colonies, their permanency or the antagonism of one individual to another of the same species.

Feeding and drinking including list of food and its relative importance of each, seasonal variation in this, adaptations for special food getting, manner of eating and storing food, need of water and response, a drinking manner of drinking.

In typical characteristics including temperament, intelligence, attention, courage, care of young, playfulness, length of life, sanitation.

Relation of characteristics and habits to existence and survival including movements, attitudes, intelligence, coloration, correlating characteristics with nesting, hibernation.

Breeding habits including courting, nuptial display, of mating, polygamous, monogamous, etc., dates of pairing, aseasonated behavior, length of gestation, period, date and birth of young, condition of young at birth, number of litters per year, relation of male to female, care of young, carrying, feeding, time of weaning, length of time in nest.

Nests and shelters including dense or shelters for food storage, sleeping, for young, trails to dens, protection, by closing burrows.

#### References

- Anderson, R. M. 1919. *Canadian Field Naturalist* 22, pp. 95-99 (on mammal study).  
 Taylor, W. F. 1930. *Our new knowledge of Mammalian Life Histories*. U. S. Dept. Agr., Misc. Pub. No. 99.

#### SYSTEMATIC SECTION

Mammal is an awkward word, but has not been thoroughly reworded into English usage. The word animal is often taken in a restricted sense to mean animals only, but animal properly speaking includes all living things that are not plants. There is no other English word that is exactly equivalent, beast and quadruped do not include men, bats and whales.

While there is no controversy as to the fact that the Federal Reserve, through its monetary policy, has been contributing to the inflationary process, the question of the degree of its contribution is a matter of debate. The Federal Reserve has been accused of being the primary cause of the inflation, while others have argued that it is only a contributing factor. The Federal Reserve has been accused of being the primary cause of the inflation, while others have argued that it is only a contributing factor. The Federal Reserve has been accused of being the primary cause of the inflation, while others have argued that it is only a contributing factor.

[illegible]

It is common to find a child who has been brought to the attention of a language specialist because of a language delay or disorder, and who is subsequently found to have a specific language impairment. This is often the case for children who are referred to a specialist for a language assessment, but who are found to have a specific language impairment. The name of this condition has been changed from "specific language impairment" to "specific language disorder" to reflect the fact that the child has a disorder, not just a delay. The name of the disorder has been changed from "specific language impairment" to "specific language disorder" to reflect the fact that the child has a disorder, not just a delay.

[illegible]

It is a common mistake to believe that a species is "endemic" to a region just because it is found only in that region. In fact, a species is "endemic" to a region only if it is found nowhere else in the world. For example, the Galapagos finches are endemic to the Galapagos Islands because they are found nowhere else in the world.

In using the following guidelines, more than one step may work a page 40 to 43 and be a variation, a mix of the order and direction may be necessary in working. The next step is to try out the above guidelines, steps explained, on pages 44 to 46. Form a committee due to people to visit family the parts was unknown, experienced workers and to determine that family, kept the answers will be found.

The keys in this volume always present two alternatives; if it is not one thing it is the other which offers two further choices until the final identification is reached.

I enter each species as given but the English vernacular name follows by the current form. There is given the size with a coordinate of ear length (from tip of nose to tip of ear) and of tail length (from ear length to the end of the tail length) if not a length of ear and length at shoulder as much as given. There are or are not a sexual and sex ratio percentage range if variation can be expected positively. I do not know of other of the general characters and the hair effect but a thing is necessary for identification. Skin characters are sometimes included if they may be useful for identification. Then I give a distribution in the subject's range and in Alberta with diagnosis. The characters and synopsis of their range. With light species can be identified by the and I know about subsequent usually have to be identified by comparison of specimens.

Then I come to the distribution of the species in Alberta usually arranged in R. M. Anderson's Catalogue of the Mammals of Canada. Under Life History is a synopsis of the reproduction. Herpetological Periods has been converted into and (and I have drawn from a wide variety of sources and although perhaps not applicable. Alberta collections the notes guide we have to these subjects. The general section is devoted to some general aspects of the animal and more of the and the write-up concludes with several references from which data was drawn and to which the reader is referred.

The order and arrangement follows in general that of Miller 1924 List of North American Recent Mammals 1923.

The data on fur returns are largely from data supplied in mimeographed form by the Dominion Bureau of Statistics.

Measurements are in millimeters as used by scientists generally unless otherwise indicated. Approximations in inches are usually given after the first measurements under each species write-up.

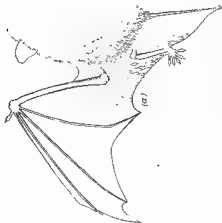


Figure 23. Bat, (a) and (b) in flight, in wing and tail.



Figure 24. Bat, (a) and (b) in flight, in wing and tail.

SYNOPSIS OF THE ORDERS OF ALBERTA MAMMALS  
(based on those species found in the province)



Figure 24. Head and skull of  
a crepuscular shrew

men long), clawed, mouse-like mammals with long pointed snouts and with the jaws filled with simple or generalized teeth with sharp cusps, which are often crestlike tapers. eyes and ears are normal, but very small and inconspicuous.

Order 2—Chiroptera (bats). There is one family (See p. 55, represented in Alberta. Its members have their forelimbs modified into wings, and the teeth with many sharp cusps adapted for insect eating, the canine teeth are conspicuous.



Figure 25. (a) *Wolverine* skull, showing the highly specialized teeth, and (b) view of upper tooth row right side to show shearing edge of molar teeth.

Order 3. Carnivora (carnivorous or flesh eaters). There are five families represented in Alberta (See pp. 66-69).

whose members may be recognized as being small to large (least weasel 200 mm. grasshopper 2-25 in. long), clawed mammals with adaptations for capturing other animals most evident in their dentition with the long canine teeth or fangs.



Figure 26 (a) Fox ear skull (weasel-like) showing the three groups of growing incisors are separated from the cheek or gnawing molar teeth and (b) head of another rodent, white-toothed mouse.



Figure 27 Skull of a lagomorph (snowshoe rabbit) showing the second pair of upper incisors.

Order 4 Rodentia (rodents or gnawing animals). There are seven families represented in Alberta whose members may be recognized as mostly small (but with one species, the beaver about one metre long), clawed mammals with their dentition adapted for gnawing, in

both the upper and lower jaws are one pair of crescent-shaped incisors, and between them and the cheek or grinding teeth is a considerable gap



Figure 22. Skull of a Virginian deer, showing antlers and lack of upper incisors.

Order 5—Lagomorpha (rabbits, hares, etc.) There are two families represented in Alberta, whose members may be recognized as medium sized (175 to 600 mm. long), clawed mammals with gnawing teeth similar to those in rodents, but with two pairs of incisors in the upper jaw, one pair of small, non-functional incisors being situated just behind the functional pair



### Order 6 - Artiodactyla cloven hooved mammals.

Three families are represented in Alberta, whose members are recognizable as being cloven-hoofed mammals without upper incisors (though some species have canine teeth), many of them bear horns or antlers.

## ORDER INSEktivora INSECT EATERS

There are eight families with over 300 species in this order. They are widely distributed over the world except Australia and most of South America. The members of this order vary in size from the smallest known mammal a tiny shrew up to the solenodon of the West Indies with a body length of somewhat less than 2 feet. They are modified for many ways of living burrowing, climbing and swimming. One of the most striking members is the European hedgehog.

In Canada there are two families represented, that of the moles (Talpidae) and the shrews (Soricidae). Only shrews occur in Alberta. Though no moles are found here the name mole is sometimes applied to a quite different animal, the pocket gopher. The pocket gopher however is a rodent and resembles the mole only in certain habits, perhaps the most conspicuous being that it is seldom seen whereas the mounds of earth like "mole hills", that it throws up from its underground burrowings are conspicuous.

Moles are found in Eastern Canada as far west as Manitoba, and again in northwestern British Columbia but are lacking in the intervening area.

### FAMILY SORICIDAE. SHREWS

Shrews are represented by many species all over the world except in most of South America and Australia, that is, over the range of the order Insectivora. Four genera and thirteen species are found in Canada. In Alberta five species occur, all are small 160 mm or less in length. Four of them are terrestrial animals, often making little runways through the moss, or through surface litter of dead leaves, and preferring damp habitats. One, the water shrew is modified for an aquatic existence.

[illegible]

But it is not the greatest evidence that we have at hand in the representation of a simplified picture of the present and future of the world, although in the mathematics of the future, there is a suggestion that the future of the world is a very different thing from the present.

Sharks are killed by humans primarily as baiting fishes for sale and consumption. Sometimes baitfish that are killed and left floating on the water surface and are consumed by the shark community when scattered by their shark prey.

In the last summer and in a last experience with me, my friends the French had not seen a soft and agreeable man, a study and a quiet habit, a calm and perhaps the most serious of all, a man at the end of their life, and have only died of old age.

To keep a ship safe crews know in the harbor that when actually over the sea generally confined with more though a regular as closely reported to various stations as in use. Jackson a number of operations have got to protect them in various parts of the world. In England it used to be help of that contact with a few words in a way and the situation of a few of a few words was the proper treatment to gain relief. A few words was required by seeing a few words in a hole in an ash and then passing the line. The late

of the shrew was supposed to cause death. In Alaska the Eskimo believe that shrews encountered on the sea ice might dart at a person, burrow under his skin and finally reaching the heart cause death.

#### References

- Jackson, 1938 No Amer Fauna No. 51 (revision,  
 Bell, 1837 A Hist. of Brit. Quadrupeds, London. pp. 111, 112  
 (includes old British superstitions)  
 Hamilton, W. J., and D. B. Cook, 1960 Jour. Forestry, 58, pp  
 468-473 (shrews beneficial to the forests)

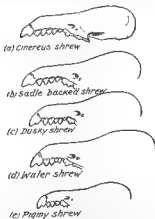


Figure 29. Skulls of various shrews to show the characters of the un-cuspid teeth, so useful in some identifications. (a) cinereus shrew, (b) saddle-backed shrew, (c) dusky shrew, (d) water shrew, (e) pigmy shrew.

Moore, A. W. 1942 Jour. Mammal., 23, pp. 37-41 (on shrews eating Douglas fir seeds)

Hamilton, 1942 Amer. Nat., 76, pp. 206-215 (short life span of small mammals)

#### KEY TO ALBERTA SHREWS

- 1 Size larger, total length 140 mm. or more—water shrew (*Sorex palustris*)
- (1a) Size smaller, total length 120 mm. or less 2
- (2) Pattern tricoloured, back darkest, sides paler, belly palest 3
- (2a) Pattern brown-red, back and sides show some colour 4
- (3) Size larger, total length over 105 mm.—saddle-backed shrew (*Sorex arcticus*)
- (3a) Size smaller, total length less than 100 mm.—cinereus shrew (*Sorex cinereus*) (race *hoydeni*)
- (4) Unequal teeth in upper jaw, apparently 2—pigmy shrew (*Microsorex hoyi*)
- (4a) Unequal teeth in upper jaw, apparently 3 5
- (5) Third unequipped tooth smaller than 4th—dusky shrew (*Sorex obscurus*)
- (5a) Third unequipped tooth equal to or larger than 4th—cinereus shrew (*Sorex cinereus*)

**Diagnosis.** Total length 82-94 mm. (3.2-3.7 in.), tail 22-37 mm. hind foot 10.5-12 mm. colour greyish brown to brownish grey above, sides slightly to somewhat paler shading to grey on belly, skull with 4th unequipped tooth about equal to or smaller than 3rd.



Figure 30. Cinereus shrew

**Cinereus Shrew** *Sorex cinereus* Kerr

Compared with other similar species it most resembles the pigmy shrew (*M. hoyi*) and the dusky shrew (*S. obscurus*), but the tooth character is diagnostic. The measurements are also useful, as a tentative means of identification, the dusky shrew is larger (total length 115 mm. (4.5 in.), tail 48 mm., hind foot 13 mm.

**Geographical Variation.** Two subspecies are recognizable in Alberta.

(1) *Sorex cinereus cinereus* Kerr. Total length 83.7 mm. (3.3 in.); tail 37.2 mm.; hind foot 12 mm. (average 14 specimens). Wood Buffalo Park. Soper: a grey-brown animal with sides little paler than back. occupies most of the range of the species in the province except that of the west. Some animals from the western part of the province (Soba House, Egypt Lake) show a tendency toward the Pacific coast form. See description in the larger skull and darker coloration. (Allen, Crowell).

(2) *Sorex cinereus kayleri* Baird. Total length 83.82 mm. (3.3-3.2 in.); tail 24.22 mm.; hind foot 10.5-11 mm. (2 young specimens). Soper: smaller than *S. cinereus* with a shorter tail and paler in colour with sides distinctly paler than back. occurs in east-central Alberta. I collected at Tolay. These showed an approach to *cinereus* in colour and in the narrowness of rostrum. (Soper).

Allen records an albino from Soba Beach.

**Distribution in Alberta.** Widely distributed from the northern border south to Red Deer River and in the mountains and foothills to Waterton Park, apparently absent from the southern prairies and from the Cypress Hills.

**Life History.** Inhabits forest and adjacent grassland. 4 to 10 young born in summer (Fort Chipewyan June 3, female with 10 embryos). Preder: in a concealed nest where they stay until nearly full grown, food chiefly insects and other invertebrate animals, enemies hawks, owls and carnivorous mammals. (Pen killed and left uneaten by mammals but sometimes eaten).

**General.** The five lace like tracks. *C. cinereus* shrews over the snow and is them to be active throughout the long northern winter. When the temperature stands at 40° below zero and constant motion is necessary to keep one from freezing, we can not help wondering that this tiny creature manages to sustain life. (Preder). In Wood Buffalo Park 'in the bitterest cold' I sometimes they are occasionally found dead on open snowfields or in deep-trampled sled tracks in the forest' (Soper). Perhaps they

die from exposure, but their life span is short - a year to 18 months - and they may have come suddenly to the end of their allotted life span.

In summer these tiny animals foraging over the forest floor - or through the interstices of grass or undergrowth - leave little indication of their passing. Traps baited with oatmeal or hares - however - add evidence that they forage actively day or night.

Watkin Lacasse of Banff told of a mouse - perhaps this species - coming into his cabin on Bow River in winter some years ago and eating a hole into the end of a slab of hares. Through this it entered and ate out the whole of the interior - leaving only a hollow shell.

Though numerous shrews cause some annoyance to woodland dwellers by entering cabins and eating meat and fat they may have a beneficial effect on the forests by controlling insects destructive to forest trees.

#### References

- Allen 1925 Jour. Mammals 16, p. 223 (tailless from Beha Beach)  
 Bloomer 1932 Jour. Mammals 13 pp. 136-142 (habits in captivity)  
 Crome 1943 Bull. Amer. Mus. Nat. Hist. 90 p. 204 (northern Rockies)  
 Goodwin 1928 Jour. Mammals 10 p. 241 (habits in the wild)  
 Hamilton 1941 Jour. Mammals 22 p. 282 (food)  
 Redmer 1932 Can. Jour. Zool. 10, pp. 5-6 (Jasper area)  
 Jackson 1938 No. Amer. Fauna, No. 31 (common many Alberta localities)  
 Morris 1942 Can. Entomologist 74 pp. 197-200 (control of spruce sawfly by small mammals)  
 Peck 1908 No. Amer. Fauna No. 27 pp. 242-244 (northern Alberta)  
 Sheldon 1936 Jour. Mammals 17 p. 306 (habits in the wild)  
 Soper 1921 Can. Field-Nat. 35 p. 110-111 (as prey)  
 Soper 1942 Jour. Mammals 23 pp. 124-125 (Wood Buffalo Park)

#### Saddle-back Shrew, *Sorex nelsoni* Kerr

*Diagnosis.* Total length 112.5 mm (4.4 in.) tail 42 mm. hind foot 13.5 mm (Soper Wood Buffalo Park). back rich dark brown or brownish black - sides pale brown contrasting sharply with back - underparts greyish - contrasting with sides giving a tricoloured pattern that is rather distinctive in the adult though much less striking in the young. skull rather heavy with large teeth with 3rd unicuspid tooth subequal to or larger than 4th.

**Geographical Variation** Specimens are referable to *Sorex arcticus arcticus* Kerr

**Distribution in Alberta** Recorded south to Edmonton and Blindman and Red Deer Rivers (Jackson)

**Life History** Probably similar to that of the cinereus shrew. Cowan in the Peace River country. H.C. found nursing females in mid-May.

**General** The saddle back shrew with its red-brown sides and tricolor pattern is the most beautiful of our natives. Unfortunately it is rare. In Wood Buffalo Park Soper found this one of the rarest small mammals of the region and collected only five in 2 years. It was found in grassy moist low places about sloughs, and in the rank vegetation of large meadows. That it may sometimes be common is indicated by Cowan who found it the most abundant shrew in the Peace River country in neighbouring British Columbia. There also it was taken in wet habitats: meadow mouse runways through sedges in marshland in alder swamps and along streams in aspen forest.

#### References

- Jackson 1928 No Amer Fauna No 31 (revision, Alberta localities)  
 Soper 1942 Jour Mammals 23 : 124. 1 habitat measurements, Wood Buffalo Park)  
 Cowan 1930 Occ Papers H.C. Peabody Mus. No 1 p 79 (Peace River)

#### Dusky Shrew. *Sorex obscurus* Merriam

**Diagnosis** Total length 109-113 mm (4 3 4 4 in.), tail 44-45 mm, hind foot 12.6-13.6 mm. Colour above brownish, sides about same colour as back, below pale grey, skull with 3rd uncusured tooth distinctly smaller than 4th.

Externally similar to *S. cinereus* and *Microsorex hoggii*, but distinctly larger, both characters diagnostic.

**Geographical Variation** From British Columbia to Manitoba there is a progressive darkening in colour making it advisable to recognize by name each end of this series with the dividing line in Alberta. Thus the following two lightly differentiated races are recognizable in Alberta.

(1) *S. c. obscurus* Merriam. Total length 113 mm (4.4 in.), tail 45.8 mm, hind foot 13.6 mm (average 6 Banff specimens); a lighter coloured form, ranging in the north of the province (Wood Buffalo Park and Athabasca) and along the slopes of the Rockies up to timberline south to Waterton Lakes Park.

(2) *S. c. septentrionalis* Anderson and Razel. Total length 109.8 mm (4.3 in.), tail 44.2 mm, hind foot 12.6 mm (average 6 Cypress Hills specimens). Similar to (1) but colour considerably darker and more fuscous; skulls very similar but cranium averages higher and more flat-faced in Alberta (and only 1 the isolated Cypress Hills).

*Life History.* Similar to that of *S. c. noreus*; inhabits forests and adjacent grasslands, often common.

*General.* This species occurs along with the riverine shrew and they are often equally abundant. Approaching timberline the former species is perhaps more common and goes above timberline more commonly.

#### References

- Jackson 1923. No Amer. Fauna No. 55 (revision).  
Anderson and Razel 1945. Can. Field-Nat. 59 pp. 47-48 (taxonomy).

#### Water Shrew, *Sorex palustris* Richardson

*Diagnosis.* Size largest of our shrews: total length 151-160 mm (5.9-6.2 in.), tail 72-74 mm (2.8-2.9 in.), hind foot 20 mm; hind feet conspicuously fringed with hair for swimming; fur with a silvery sheen; back and sides greyish black to black, more or less grizzled with white; below silvery grey; the inner grey of under sides extending onto upper lips; skull broad and heavy.

*Geographical Variation.* Two well-marked subspecies are recognizable in Alberta.

(1) *S. p. palustris* Richardson. Total length 160 mm (6.2 in.), tail 72 mm (2.8 in.), hind foot 20 mm (Mantoba average 2 females; lack of a larger form (the dorsal pelage with little or no indication of being grizzled) and flecked with white occurs in the north, south to Edmonton (Jackson).



(2) *S. P. navigator* Baird. Total length 151 mm (5-9 in. tail 74.3 mm (2.9 in.), hind foot 19.9 mm. average 10 specimens Waterton Lakes) generally averages smaller than *S. P. parvulus*, with longer tail. Upper parts much more grizzled and flecked with white, occurs in the Rocky Mountains up to 7,600 feet (Crowe) from Smoky River south to Waterton Lakes. There is a slight tendency toward intergradation with *S. P. parvulus* in this area (Crowe).

*Distribution in Alberta*. The northern part of the province, south to Edmonton, and in the mountains south to the International Boundary.

*Life History*. Amphibious, 5 to 7 young born in summer, food mostly insects and other small invertebrates, said to eat fish but this has not been proved by stomach investigations usually rare.

*General*. The water shrew is amphibious and its life is spent along the shores of ponds, lakes, and streams in forest and brush and Mr. K. Racey of Vancouver was fortunate enough to be able to watch one of these elusive silvery sprites for some time in British Columbia. He writes of it, "We noticed a movement in the water at the base of a tree the roots of which extended into the water. In a moment along came a water shrew. It ran under a log on which we were seated and swam about a small pond behind us. It made a buzzing sound as it travelled rapidly over the water and then it would seize hold of partly submerged branches and run along these to the bottom of the pond. The shrew after hunting about for some minutes ran under some logs and into another small pond where I watched it catch a beetle climb out on a log and



Figure 31. Hind foot of water shrew (right) showing the lateral fringe of hair, as a contrast for an example, as compared with the hind foot of a saddle-backed shrew (left) which lacks this modification.

proceed to devour the insect. It did not touch the food with its feet but held its head high while eating.

### References

- Racey, A. and I. McT. Cowie 1936. Report of Prov. Museum B.C. 1935, p. H19 (habits in B.C.).  
 Jackson 1928. No. Amer. Fauna, No. 51 (revision Alberta localities).  
 Henshaw 1930. Jour. Mammal. vol. 11, pp. 27-28 (food).  
 Crowe 1942. Bull. Amer. Mus. Nat. Hist. 86: 365 (seasonary occurrence in Rocky Mountains).  
 Racey 1935. No. Amer. Fauna, No. 54, pp. 135-136 (habits).

### Pigmy Shrew. *Microsorex hoyi* Baird

**Diagnosis.** The smallest of our shrews, total length 81-85 mm (3.1-3.3 in.), tail 28-30 mm (1 in), hind foot 10.5 mm (as our above mentioned below greyish) the skull when viewed from the side appears to hold only 3 un-cusped teeth.

The small size and short tail are clues to identification, the tooth character is diagnostic.

**Geographical Variation.** This is evident chiefly in the shape of the skull necessitating the recognition of two subspecies in Alberta as follows:

(1) *M. h. hoyi* Baird. Total length 81.3 mm (3.1 in.), tail 30.7 mm, hind foot 10.5 mm (average specimens, Jackson) recorded along Red Deer River and at the forks of Blinneman and Red Deer Rivers (Jackson).

(2) *M. h. interlectus* Jackson. Total length 85 mm (3.3 in.), tail 28 mm, hind foot 10.5 mm (a Yukon specimen), very similar in size and colour to *M. h. hoyi* though slightly greyer in summer pelage (skull more angular with distinctly higher and broader brain case (Jackson), occurs in northern Alberta, south to Entrance (near Jasper) (Crowe).

**Distribution in Alberta.** Probably the lower part of the northern part of the province, and in the mountains of the west but details remain to be worked out, probably absent from the plains of the southeast.

**Life History.** Little known, presumably similar to that of *S. eremicus*.

*General.* The pygmy shrew, with an adult weight of as little as 2 to 3 grammes (about  $\frac{1}{16}$  to  $\frac{1}{8}$  ounce) is the smallest North American mammal.

The distribution and ecology of this tiny animal need to be worked out. What little we know indicates it is similar in habitat requirements to the cinereous shrew, but at times, in some places, the pygmy shrew is the more common.

#### References

- Jackson, 1925. No Amer Fauna, No 51 (revises Alberta bushland).  
 Gross, 1943. Bull Amer Mus Nat Hist, 80, p. 395 (occurrence at  
 Entrance, taxonomy).  
 Peck, 1908. No Amer Fauna, No 27, pp. 245-248 (occurrence in  
 the north under the name *Microsorex eremicus*).

## ORDER CHIROPTERA BATS

Bats are the only animals that can fly. Other so-called flying mammals like 'flying squirrel' have only gliding membranes.

Bats occur in all continental areas and many islands throughout the world, but are largely absent from polar regions.

In size bats vary from small forms with bodies no bigger than that of a mouse up to the huge fruit bats of the old world tropics with a body length of 300 mm. and a wing span of about 1.5 metres. In feeding habits bats are surprisingly diversified, some are insect eaters, catching their prey on the wing (as are all Canadian bats), others are fruit eaters, and natives in the tropics have to guard their bananas and pawpaws from them; others in South America feed on the blood of mammals, including man, and others catch fish from the surface of the water and eat them. They are nocturnal, spending the day at rest and usually hang up-side-down, clinging to their support with their hind feet.

Bats have long been considered beasts of ill omen. In former times in Europe they were much used in working magic both for good and ill. Occidental people still dislike bats, because they get in 'indies' hair (this has happened, but is rare) or because they are believed to carry

bedbugs. It is true that bats carry a host of parasites (as do most mammals) including relatives of the bedbug *Cimex lectularius* that are parasites on man but it has not been shown that they transfer them to man.

For a delightful volume dealing with the many interesting aspects of bats and their lives the reader is referred to Dr. Allen's authoritative book.

Only two of the dozen families are represented in Canada, and only one the Vesperilionidae, in Alberta.

#### References

Allen, 1939. Bats. Harvard Univ. Press.

#### FAMILY—VESPERTILIONIDAE. SMALL INSECTIVOROUS BATS

This family of widespread distribution, contains over 300 species in about 40 genera.

In Alberta 8 species have been recorded. They seem limited to timber or brushy areas in Alberta and absent from the southern plains. They are all small insect-eating species (our largest species is the hoary bat with a body length of about 130 mm. and a wing spread of about 315 mm.), are usually active only at night, some species spend the day hanging up in buildings or in caves, some hang up in trees, some species are solitary and some gather in considerable numbers in colonies to sleep. Frequently the females keep apart from the males in separate groups, some species migrate to warmer climates at the approach of winter, others hibernate in caves (the details of their occurrence and behaviour in Alberta are very scanty).

In most species 1 or 2 young are born but in the red bat 3 or 4 young may be the usual number, these young are carried about by the mother clinging to her body, on her nightly flights for some time.

One of the habits of certain small bats that has long attracted attention is their ability to avoid obstacles in flight even when they are blinded. Scientists at Harvard experimented and found that sight was actually a detriment to bats in avoiding wires. They showed that super-sonic sounds of some 50,000 vibrations per second (human



Figure 34. Little brown bat at rest.

Figure 33. Heads of various bats, showing ear shapes. (a) red bat, (b) big brown bat, (c) little brown bat, (d) big-eared bat, (e) town bat, (f) long-legged bat, (g) Say masked bat.

ears have a hearing range of sounds with between 20 and 20,000 vibrations per second) uttered by the bats in flight were reflected from obstacles. The bats, hearing these echoes knew where the obstacles were and avoided them.

### Reference

Allen 1939 Bats, Harvard Univ. Press.

Muller and Allen 1928 Bull. U.S. Nat. Museum, No. 144 (revision of genus *Myotis*).

### KEY TO ALBERTA BATS

- (1) Colour black, red, or grey frosted with white 3
- (1a) Colour above uniform to very pale brownish yellow 4
- (2) Colour red or grey frosted with white 3
- (2a) Colour dark with white-tipped hairs—silver haired bat (*Lasiurus noctivagus*)
- (3) Ear larger, length more than 120 mm. Colour grey—heavy bat (*Lasiurus cinereus*)
- (3a) Ear smaller, length less than 110 mm. Colour rufous red—red (*Lasiurus borealis*)
- (4) Ear larger, length more than 110 mm.—big brown bat (*Eptesicus fuscus*)
- (4a) Ear smaller, length less than 100 mm. 5
- (5) Ears large, when laid forward reaching 5 mm. or more beyond nostril—big-eared bat (*Myotis evotis*)
- (5a) Ears medium or when laid forward not reaching much beyond nostril. 6
- (6) With a definite keel on calcar 7
- (6a) With no keel on calcar—little brown bat (*Myotis lucifugus*)
- (7) Colour dark brown—long-eared bat (*Myotis volans*)
- (7a) Colour pale yellowish brown—Say masked bat (*Myotis subulatus*)

### Little Brown Bat. *Myotis lucifugus* LeCoq

**Diagnosis.** Size, total length 92 mm. (3.6 in.) tail 40 mm. hind foot 11 mm., ear from notch 12 mm., forearm 37 mm. (Alberta specimen), wing spread about 240 mm. Ear tapering to tip, when laid forward reaching to or just beyond nostril, no keel present on calcar. Membranes unferred, colour above uniform dark to light brown (varies with the subspecies) with glossy bronze tips to the pelage, below paler to buffy. The young are much darker

and sootier in colour, the ears and membranes are blackish.

**Geographical Variation.** The details of this need to be worked out, but there appears to be a darkening in colour in the western part of the province and an increase in the size of the skulls in the animals from the Jasper area. Three subspecies are probably involved.

(1) *M. l. lucifugus* LeConte. Skull averages 14.5 mm long (Crowe), probably the widespread form.

(2) *M. l. pernix* Hollister. Larger skull average 15.46 mm long, recorded from the Jasper area (Crowe).

(3) *M. l. obscurus* Muller. A darker form with a skull the size of that of *M. l. lucifugus* has been recorded from Asiniboine (near Banff), and probably occurs in the Banff area at least.

**Distribution in Alberta.** Occurs throughout in timbered or brush areas.

**Life History.** Hibernates in caves, feed insects, usually males in the autumn, one young born in the spring.

**General.** At dusk their little bats leave the hiding places to fly about with quick fluttering wing beats.

During the day they congregate in numbers in some dark place. When in an occupied building, their droppings, and their almost constant annoyance, and their scurrings and squeakings worry local people. Some places where a board nailed to the roof offers shelter, there is a whole line of little animals and ears sticking out. When disturbed it is amazing how active they are, scampering about on all fours and scurrying into other crevices.

When autumn comes they disappear from such places, presumably to some cave for hibernation.

#### References

- Crowe 1943. Bull. Amer. Mus. Nat. Hist. 89, p. 266 (taxonomy, status of *M. l. Pernix*).  
 Muller and Allen, 1928. Bull. U.S. Nat. Mus., No. 144 (taxonomy).  
 Womack 1945. Jour. Mammal. 26, pp. 22-23 (breeding behaviour, status of *M. l. Pernix*).

[Keen bat, *Myotis keeni*, is a species that under the name *Myotis subulatus* has been recorded in the older

view of the confusion regarding the species, as well as the names of bats existing then, they are better ignored, and Miller and Allen, 1928, Bull. U.S. Nat. Museum No. 144, be used as the starting point for our present knowledge of bats in the genus *Myotis*.]

# **Big-eared Bat. *Myotis evotis* Allen.**

**Diagnosis.** Size, total length 85 mm. (3 3 in.), tail 41 mm., hind foot 7.4 mm., ear from notch 19 mm. (Washington specimens, Dalquest). Ears narrow and conspicuously large, when laid forward reaching about 5 mm. beyond nostrils; calcar ordinary without, but sometimes with a rudimentary keel, membranes largely unfurred; colour, above light brown to tow colour, paler below; ears and membranes brownish black.

**Geographical Variation.** The specimens from the Rocky Mountains are distinctly darker than those from the plains, necessitating the recognition of the two following races.

(1) *Myotis evotis evotis* Allen. A pale yellowish or tow-coloured form recorded from Red Deer River near Ramsey.

(2) *Myotis evotis pacificus* Dalquest. A darker form, has been recorded from the vicinity of Jasper and Waterton Lakes.

**Distribution in Alberta.** The west and southern forested parts of the province, recorded in the foothills of the Rockies and on Red Deer River near Ramsey.

**General.** There seems to be little known about this bat. It is said to be quick and strong flying, and to frequent both caves and hollow trees, but not to gather into large colonies. It may well be found wintering in the caves and crevices along Red Deer River.

## **Reference**

Bailey, 1936. No. Amer. Fauna, No. 53, pp. 373-375 (habits in Oregon).



**Long-legged Bat.** *Myotis velans* Allen

**Diagnosis.** Size, total length 97 mm. (3 8 in.), tail 42 mm., hind foot 8 mm., ear from notch 10 mm., forearm 37 mm. Wing spread about 240 mm. (9 4 in.) (British Columbia specimens), ears moderately narrow and pointed, short, barely reaching nostril when laid forward, calcar distinctly keeled, colour above dark brown, below paler ears and membranes blackish, membranes largely unfurred.

The presence of the keel on the calcar is diagnostic, other distinctive features are the combination of short foot, short ear, and dark coloration.

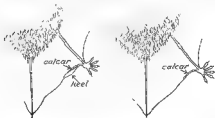


FIGURE 25. Tail, right hind foot, and part of alar membrane of (left) long-legged bat, showing keel on calcar, and (right) little brown bat, showing lack of keel on calcar.

**Geographical Variation.** Though several races are recognizable to the south of U.S., only one occurs in our area, as follows *M. v. longimanus* True.

**Distribution in Alberta.** The western part of the southern half of the province, recorded in the Rocky Mountains and east to Dried Meat Lake (southeast of Edmonton).

**General.** Vernon Bailey, the veteran field naturalist and mammal student of the United States, writes that so little is known of the habits of this species that every

record should contribute a valuable bit of information.

Hallister records a specimen from Henry House as flying about with other small bats in the evenings in the shelter of the Douglas fir groves.

#### References

- Miller and Allen, 1938 Bu. U.S. Nat. Mus., No. 144 (taxonomy)  
 Bailey 1936 No. Amer. Fauna No. 55, p. 376 (habits)  
 Hallister, 1917 Can. Alpine Jour., 4, pp. 7, 8 (Henry House record)

#### Say Masked Bat. *Myotis subulatus* Say

**Diagnosis.** Size small, total length 82 mm. (3.2 in.) tail 35 mm., hind foot 6 mm., ear from notch 10 mm., forearm 33 mm. (a female from Red Deer River), ear rather narrow and tapered, when laid forward reaches or extends slightly beyond nostril, a well-developed keel on outer ear, membranes largely uniform, colour pale yellowish brown, outer brown, with face black. Ears and membranes are blackish.

The small size, short foot, pale coloration, and black face are distinctive.

**Geographical Variation.** Only one subspecies occurs *M. s. subulatus* Say

**Distribution in Alberta.** Known only from Red Deer River, near Rusty.

**Life History.** Hibernates in caves food insects, 1 or 2 young born in the spring.

**General.** This tiny pale-coloured bat has the just and prior claim to the name *subulatus* though this was not recognized until recently. Formerly *Myotis subulatus* was used commonly for the larger, long-eared bat now known as *Myotis keeni*, and which is not known to occur in Alberta.

#### Silver-haired Bat. *Lasiurus noctivagus* LeConte

**Diagnosis.** Size, total length 98 mm. (3.8 in.), tail 43 mm., hind foot 11 mm., ear from notch 12 mm., forearm 39 mm. wing spread about 280 mm. (11 in.) (male, Red Deer River) ear wide and blunt, colour brownish black to black with many hairs white tipped (hence the name), especially on the upperparts, ears and membranes blackish. Colour is a diagnostic character of this species.

**Geographical Variation** No subspecies recognizable.

**Distribution in Alberta.** Probably occurs throughout in forested areas, specimens from Jasper area and Red Deer in National Museum.

**Life History** Migrates southward for the winter, food, insects, 1 to 2 young born in spring.

**General** Mr F. H. Riggall tells us that in the Twin Butte area he usually finds this species during the day under the bark of burned spruces where the bark has blistered and curled up. The bats usually betray their presence by squeaking when one rides past.

#### **Big Brown Bat** *Eptesicus fuscus* Beauxue

**Diagnosis** Size total length 120 mm (4.7 in.), tail 42 mm., hind foot 12 mm., ear (dry) 13 mm., forearm 45 mm. (male, Red Deer River), wing spread about 290 mm (11.4 in.). Ear rather rounded, membranes largely unfurrowed, colour pale uniform brown above, paler to whitish below, ear and membranes blackish.

**Geographical Variation.** In western British Columbia this species is very dark, in eastern Canada it is moderately dark, and on the prairies it is pale. This pale form is the one occurring in Alberta and is known as *E. f. pallidus* Young.

**Distribution in Alberta** Probably occurs in timbered areas throughout, recorded from Waterton Lakes to Wood Buffalo Park.

**Life History** Hibernates in caves and in buildings, food, insects, mates in autumn, 2 (sometimes 1) young born in the spring.

**General** The big brown bat sleeps away the day in some old building, in a hollow tree, or other crevice. At dusk, usually a little later than the small brown bat, it emerges to fly about catching its insect food. Its flight is steadier and with a slower wingbeat than the quick, fluttering flight of the smaller bats.

## References

- Allen, 1903 *Can. Field Nat.*, 47 pp. 31, 32 (taxonomy)  
 Hens. loc., 1922 *Jour. Mammals* 17, pp. 268-273 (food)  
 Wimsatt, W. A., 1945 *Jour. Mammals*, 26, pp. 23-32 (breeding behaviour, eastern United States)

**Red Bat.** *Lasiurus borealis* Müller

**Diagnosis.** Size, total length, 105 mm. (4.1 in.) tail 40 mm., hind foot 7 mm. ear 9 mm. forearm 39 mm. (Manitoba specimens). Ear short, broad, and rounded at tip, upper surface of interfemoral membrane densely furred, colour yellowish red or rufous red, often frosted with white, especially above.

The colour, size and furred upper side of the interfemoral membrane are distinctive.

**Geographical Variation.** On the Pacific coast a dark form occurs, eastward is a pale form, *L.b. borealis* Müller, that occurs in Alberta.

**Distribution in Alberta.** Probably widespread in forested areas, but data scanty.

**Life History.** Roosts hanging amongst the foliage of trees, migrates southward in winter, food insects, 1 to 4 young born in the spring.

**General.** The distinctive, beautiful colour of this bat makes it an aristocrat among our bats, and its habits of migrating, and of roosting amongst the foliage of trees set it off sharply in habits from the brown, cave-inhabiting bats.

## Reference

- Lyon, 1903 *Proc. U.S. Nat. Mus.*, 26, pp. 425, 426 (reproduction)

**Hoary Bat.** *Lasiurus cinereus* Beauvois

**Diagnosis.** Size, largest of our bats, total length 128 mm., tail 58 mm., hind foot 17 mm., ear (dry) 12 mm., forearm 55 mm. (Saskatchewan specimen), wing spread about 315 mm., ear short, blunt, and rounded at tip,

upper surface of interfemoral membrane densely furred, colour yellowish brown or grey heavily frosted with white above and below

*Geographical Variation.* None

*Distribution in Alberta.* Probably breeds in northern forests and migrates through the southern wooded parts.

*Life History.* Roosts amongst foliage of trees, migrates south in winters, food insects, young 2 (sometimes 4?) in spring.

*General.* This is the largest and most striking of our bats. Though sometimes said to breed only in the boreal forests it has been found breeding in the northern United States. An occasional wanderer goes far north into the barren grounds, as a record from Southampton indicates.

*References*

- Hitchcock. 1903. Can. Field-Nat. 37, p. 86 (Southampton Island record)  
 McClure. 1902. Jour. Mammals! 23, pp. 430-434 (winter habits, breeding, Iowa)

## ORDER—CARNIVORA CARNIVORES, OR FLESH-EATERS, OR BEASTS OF PREY

This order is often used to include the seals as well as the terrestrial beasts of prey for seals are beasts of prey adapted for an aquatic existence. The order as here used does not include the seals.

The carnivores have a widespread distribution, though in Australia they have only one representative, the dingo, that may have been introduced by early man. They are most numerous as to species in the African and southern Asiatic areas.

Our familiar dogs and cats are representatives of two families, the ferret used in hunting rabbits, is another, and the bear of circuses is another.

Most members of this group are especially modified for capturing other vertebrate animals by stealth or by pursuit, but a few such as the bears and pandas now have

largely a vegetable diet. In the diet of some other forms insects are very important, as with our skunks, and others are primarily carrion eaters, such as the hyenas.

The young are born in an undeveloped state and are dependent on the parents caring for them in a nest or a shelter for a longer or shorter length of time.

Few members of this group have been extensively domesticated though the dog is widely used in hunting, and in certain areas as a draught animal. Many wild species provide important furs, and foxes and mink are being ranch-raised for this purpose. The beasts of prey have perhaps attracted more attention by the losses they have caused man. Lions and tigers sometimes become man-eaters, as well as destroying stock, wolves, especially in the old world have been dangerous to man, and in the new world they have been considered enemies of stock, and of other more desirable big game species of mammals. Smaller species are accused of killing lesser livestock, such as coyotes killing sheep and turkeys, and foxes and weasels killing chickens.

Of the seven families usually recognized, two, the *Hyaenidae* (hyenas) and the *Viverridae* (civets, mongooses, etc.), are not American. Representatives of the other five families occur in Alberta.

#### SYNOPSIS OF FAMILIES

(Based on Alberta species)

Family 1 *Ursidae* (bears). Size large, over one metre long, body stout, legs short, feet plantigrade with five functional toes on each foot, claws well developed, non-retractile, tail rudimentary, muzzle somewhat elongate, premolars lost at an early age, cheek teeth tuberculate and adapted for crushing (p. 68).

Family 2—*Procyonidae* (raccoons, etc.). Our one Alberta form is a medium-sized animal (length about 650 mm.), body stout, feet slender, plantigrade, with five functional claws on each foot, claws non-retractile, tail of

moderate size, marked with dark coloured rings, muzzle elongate, cheek teeth tuberculate and adapted for crushing (p 75)



Figure 26 (a) Side view of black bear skull, and (b) view of upper teeth, right side, of bear, to show broad, crushing cheek teeth.



Figure 27 (a) Raccoon skull, side view, and (b) view of upper teeth, right side, to show crushing shape of cheek teeth.

Family 3—Mustelidae (weasels and their relatives)  
Variable as to size and shape, small to medium-sized animals (200 mm to 1.25 metres long), slender to bulky in shape, legs short, feet plantigrade, some digitigrade,

five functional toes on each foot, claws retractile or non-retractile, tail moderately developed, skull with an elongated brain case and a shortened facial part, cheek teeth modified for shearing and cutting (p. 78)



Figure 28. (a) Mink skull, side view, and (b) lower view (without mandible).



Figure 29. (a) Wolf skull, side view, and (b) view of upper teeth, right side, to show shearing shape of some cheek teeth.

Family 4—Canidae (dogs, wolves, etc.) Medium-sized to large, dog-like carnivores, length 500 mm. to 2 metres, legs rather long, feet digitigrade with four functional toes and one rudimentary toe on the front foot, and four toes on the hind foot, claws blunt, non-retractile, tail well developed, muzzle elongate, cheek teeth modified for shearing (p. 103)



Family 5—Felidae (cats and their relatives) Size, medium to large, length 1 metre to 2.8 metres (40-112 in.); legs moderately long, feet digitigrade, toes five (one rudimentary) on fore feet, four on hind feet, claws sharp, retractile, tail long or short, head blunt and rounded, cheek teeth modified for shearing (p. 116).



Figure 40. (a) Cougar skull, side view, and (b) view of upper teeth, right side, to show shortened tooth row and shearing type of cheek teeth.

#### FAMILY—URSIDAE. BEARS

The bears are mainly northern in distribution, occurring in North America, Europe, Asia, and in northern South America and northwest Africa. They are all rather similar in general appearance. The polar bears are semi-aquatic, the black bears and their Asiatic relatives are partly arboreal, our grizzly bears are terrestrial.

Recent extreme authors have recognized a host of species in certain groups, notably the grizzly big brown assemblage. Older authorities considered only few species necessary, and pointed out the close relationship between the grizzly and brown bears of North America and the brown bears of northern Asia and Europe.

Bears are largely vegetarians, insect eaters, and scavengers. Our species hibernate during the winter months. They mate in the summer, the young are born in a very small helpless state while the female is in

hibernation the following winter. They take more than one year to reach maturity and it seems that the females do not mate every year.



Figure 41. Head of black bear

#### KEY TO ALBERTA BEARS

Cannot swim & brownish hump on shoulder evident; fore claws much longer than hind claws (greater part of nose blackish); colour brown or black, no hump on shoulder; fore claws about equal; hind claws as long as back toes; claws are pointed.

#### Black Bear; Brown Bear (*Ursus americanus* Pallas)

*Diagnosis.* Size: total length up to 1400 mm (55 1/2 in); tail 90 mm (3 5/8 in); ear from notch 126 mm (height at shoulder 740 mm (29 7/8 in); weight about 350 pounds (in Waterton Lakes forest). A large black or red eye "mask" ears conspicuous; tail intermediate; hind claws about same length as hind claws; colour generally black or brown; inside brown; often a white mark appears on the throat.

*Geographical Variation.* In eastern Canada the pelage is usually black; on the Rocky Mountains a brown colour phase is of not uncommon occurrence; on parts of the

British Columbia coast a white phase occurs, in southeast Alaska a bluish phase occurs. geographical variations in size, and skull characters are used for characterizing subspecies. In Alberta the following subspecies are given by Anderson



Figure 42 Black bear (a) front paw showing short claws, and (b) an enlarged front claw

*Ursus americanus americanus* Pallas. A medium-sized black bear, in which the brown colour phase is rare, skull, condylobasal length 266.5 mm, zygomatic breadth 178 mm, recorded from Wood Buffalo Park, but specimens show an approach to the next form.

*Ursus americanus cinnamonus* Audubon and Bachman. A rather large bear showing the brown or cinnamon phase more commonly than the eastern bears, skull heavier and more massive, condylobasal length 277 mm, zygomatic breadth 196 mm, recorded in the Rocky Mountains.

It should be noted that frequently the black bears are placed in the separate genus *Euarctos*. In this paper the more inclusive genus *Ursus* is used.

**Distribution in Alberta.** Wooded areas in the northern half of the province, and the Rocky Mountains.

**Life History.** Probably mates in midsummer, hibernates over winter, 1 to (rarely) 4 young born during hibernation, feeds on a wide variety of animal and vegetable foods including berries, grass, bark, roots, insects, and any meat, carrion, or garbage available.

**General.** The dozen or two black bears that feed regularly in the garbage pit at Jasper are one of the sights of the place. As the garbage truck appears the bears



Figure 43. Two black bears playing in a tree near Jasper

gotten from the forests and completely destroyed humans. They can be fed from the forest but it is a dangerous place for the bears are still wild powerful animals so they are very much dangerous and later they appear



Figure 46. Feet of black bear (from photo)

About 1940, they may have been a nuisance to the farming community. Mr. H. A. DeVries of Waterton Lakes Park states that in 1942, a black bear was the major damage to some of the crops of the farmer and he had been hunting and poisoning. The preserves had been placed in

the ice box, the pies on the verandah to end, and the family had gone out. On their return a mother bear and her two cubs were in possession, having entered by the simple method of tearing the screen off the door. The place was in a mess such as only bears can make. The pies had been eaten, the ice box knocked over and damaged, and the floor covered with a mixture of plum syrup, pickles, milk, rolled oats, and broken dishes.

Though a game animal it is so widespread that it is not much of a sportsman's attraction in remote areas. The flesh of the black bear may be delicious, and would be more widely used were it not for the common prejudice against the flesh of clawed animals. The hide is of little value in the market, and usually is not worth the trouble of preparing.

#### References

- Anderson, 1945. Ann. Rept. 1944 Prov. Sur. Nat. Hist., Quebec, pp. 17-53 (revision).  
 Rowan, 1945. Jour. Mammal., 26, p. 197 (number of young).

#### Grizzly Bear. *Ursus horribilis* Ord

**Diagnosis.** A medium-sized to large bear, total length 2,234 mm (88.4 in.), hind foot 201 mm (7.8 in.), height at shoulder 1,371 mm (54 in.) (a British Columbia female); shoulder with a pronounced hump, due in part at least to an area of longer fur, claws of front feet much



Figure 45. Grizzly bear showing hump over shoulders: (a) front paw with elongated fore-claws, and (b) an enlarged fore-claw.

longer than those of hind feet, head and shoulders appear much broader than those of a black bear, colour variable, usually brown, tipped or grizzled with yellowish, or whitish (thus the name).

The hump on the shoulder and the more bulky appearance of the forepaw, taken with the colour, are the best field characters. In the tracks the conspicuous claw marks of the front footprints, extending well beyond the ends of the toes, is diagnostic.

The relationships and identity of the many grizzlies, big browns and Alaskan bears are not properly understood. The following forms have been recorded from Alberta by Anderson:

- Ursus horribilis horribilis* Ood
- Ursus horribilis discolorus* Merriam
- Ursus horribilis cooperi* Merriam
- Ursus canadensis canadensis* Merriam
- Ursus canadensis rufipes* Merriam
- Ursus kladronensis* Elliot
- Ursus Alaskan swapper* Merriam
- Ursus latipons* Merriam

However, existing taxonomic treatments are unsatisfactory and here the grizzly bears of Alberta are uncritically grouped under the oldest name *Ursus horribilis*.

*Distribution in Alberta.* Chiefly in the Rocky Mountains, occasionally to Lesser Slave Lake, formerly common on the plains of the Prairie Provinces, where skulls are still occasionally found. Any skulls of these extinct grizzlies of the plains that are found should find permanent housing in a Museum.

*Life History.* Probably mates in spring or early summer, breeds every 2 or 3 years, hibernates, though not as profoundly or as long as does the black bear, 1 to (rarely, 3) young born to the female while in hibernation, food: roots, berries, herbaceous vegetation, carrion, small mammals and often large mammals.

*General.* The grizzly bear that used to roam the plains is gone and now these bears are largely restricted to the mountains. Usually wilder and shyer than the black bears, their presence is incompatible with human occupation and we can expect it to survive only in remote areas. It still is common in such mountain habitats, especially near and above timberline where it digs out ground squirrels and chipmunks, and feeds on roots and herbaceous matter.

In some areas it does not molest domestic stock, but in others it does. Usually in the presence of man it flees but there are rare exceptions as the case quoted by Major J. A. Wood, when at Miette a man sent his dog after a grizzly and cub that came about his cabin. The bear turned on the dog and chased it back to where the man was standing. The man climbed a tree and was kept there some time before the bears retired.

#### References

- Anderson, 1946 Catalogue of Canadian Recent Mammals (list of species).  
 Brown, 1945 Jour. Mammal., 26, p. 127 (number of young)

#### FAMILY—PROCTONIDAE RACCOONS AND THEIR RELATIVES

This family includes a number of striking and rather well known species, such as our raccoon, the kinkajou and the coati of the American tropics, and the pandas of southern Asia (though the giant panda at least is sometimes thought to be related more closely to the bears). The raccoon has long and mobile fingers that it uses like hands, is easily tamed, and makes an engaging, though some times exasperating, pet.

#### Raccoon. *Procyon lotor* Linnaeus

*Diagnosis* Size, total length 850 mm. (33 4 in.), tail 265 mm. (10 4 in.), hind foot 125 mm. (4 9 in.), sk.d. greatest length 127.1 mm. (5 in.) (a male from North Dakota Nelson and Goldman), colour greyish or brownish, the fur tipped with black, a black patch on each cheek, tail slightly bushy and ringed with dark and light, fur rather long, acris, and somewhat coarse.

*Geographical Variation.* The form that occurs is *Procyon lotor litor* Nelson and Goldman.

*Distribution in Alberta.* Southern Alberta north to Red Deer River and Banff, rare, escaped captives have been seen farther north. There is an amazing record for Wood Buffalo Park.



*Life History* Does not venture out in severe weather, but no true hibernation, nocturnal, sleeps in hollow trees, probably caves, and sometimes in old large bird nests, 3 to 6 young born in the spring, young remain in the nest for some time food includes berries, grain, insects, fish, frogs, and small mammals.



Figure 46. Raccoon studies head and tail

*General.* Forested watercourses and their vicinity are favourite raccoon habitats. It climbs and swims well.

The specific name of the raccoon, *lotor* meaning the washer refers to its habit of washing its food in water. The food is often, but not always, put in water and patted or treaded with the front feet before being eaten.

The raccoon is too scarce to be of great value as a fur bearer in Alberta. The annual total value of the raccoon taken from Alberta in the period 1919-20 to 1941-42 has varied from no. to \$955, the average value per pelt has varied annually from \$2.25 (1934-35) to \$7 (1929-32).

The Alberta raccoon yield is as follows

Year	No. of pelts	Year	No. of pelts
1919-20	191	1930-31	4
1920-21	27	1931-32	24
1921-22		1932-33	34
1922-23	8	1933-34	120
1923-24		1934-35	51
1924-25	--	1935-36	109
1925-26		1936-37	162
1926-27	16	1937-38	32
1927-28	23	1938-39	15
1928-29	9	1939-40	55
1929-30	18	1940-41	25
		1941-42	33



Figure 67 Raccoon feet (from de na)

## References

- Nelson and Goldman 1930 Jour. Mammals 11 pp. 453-480 (Lepus  
borealis)  
Hamilton, 1936 Illinois Jour. Sci. 36 : 1-11 140 Life History  
Soper 1942 Jour. Mammals 23 pp. 126-127 Wood Buffalo Park  
Nash 1943 Mammals, Commercial and 4 pp. 6-7 (weights in  
Massachusetts 5.37) leg. & averaged 14.9 pounds 2,800 females 13.1  
pounds

FAMILY MUSTELIDAE WEASELS, WELLS AND  
TINKER ALLIES

This family contains a number of very different appearing animals varying in size from medium to very small better considered under their subfamily headings. As a group the family is of widespread distribution, except for Madagascar and the Australian area.

The young of m. Alberta forms are born in a helpless state in some shelter or burrow where they stay for some time, cared for by the parent.

The typical weasels are highly carnivorous but some of their relatives, such as the skunks are omnivorous. The possession of a pair of anal glands, secreting a strong-smelling fluid characterizes many forms. This is best developed in the skunk. Some, such as the skunks hibernates in our latitude, others are active throughout the year. Most species are largely nocturnal. Five subfamilies are represented in Alberta.

GENUS & SUBFAMILIES OF MUSTELIDAE IN ALBERTA

(Based on species occurring in the province)

Subfamily 1. Mustelinae (weasels, marten, fisher, mink etc.). Body slender, legs short, feet digitigrade, toes partly webbed, claws short, sharp and semi-retractile, tail short to moderate, cylindrical to bushy, fur short to moderately long (p. 79).

Subfamily 2. Comptotheriinae (coyotes). Size large for the family. Body stout, legs short, feet subplantigrade, claws rather short and blunt, tail moderate and bushy, fur very long, colour pattern dark brown, with grey on nape and yellowish band on each side of body distinctive (p. 83).

Subfamily 3—*Lutrinae* (otters) Size medium to large (for the family) body slender, legs short toes webbed, claws short (absent in some exotic forms) tail long and tapering fur short and dense (p. 85)

Subfamily 4—*Mephitinae* (skunks) Size medium, body stout legs short feet nearly plantigrade, toes not webbed fore claws lengthened, fossorial, tail long, medium to long anal glands with development of distinctive black and white coloration fur very thin to long (p. 97)

Subfamily 5—*Taxodinae* (badgers) Size medium to large body stout flattened legs short feet subplantigrade broad toes not webbed fore claws much lengthened fossorial tail short and bushy fur rather long (p. 99)

Subfamily—*Mustelinae* Weasels, Marten, Fisher, Mink, Etc.

This subfamily includes our typical weasels and ermine the marten, fisher and mink, as well as such well known old world forms as the stout forest polecat and sable. The distribution of the subfamily is widespread occurring in Europe, Africa, Asia and the Americas. Its members are highly carnivorous most of them feeding on warm-blooded vertebrates + but some eat many insects and fish and frogs. Some are terrestrial some are partly aquatic and some partly arboreal.

Many fine furs are produced by the members of this family in northern climates and the fisher produces what is perhaps the most costly of our pelts at the present time.

Seven species occur in Alberta

#### KEY TO ALBERTA SPECIES

- (1) Body below white (and/or face also white above) 2
- (1a) Body mostly brown + face of eye with white or orange markings 3
- (2) Feet black black-footed ferret (*Mustela nigripes*) 1
- (2a) Feet not black 3
- (3) Conspicuous black tip to tail 4
- (3a) No conspicuous black tip to tail (least weasel) (*Mustela erminea*) 5
- (4) Total length over 350 mm (13.7 in.) long-tailed weasel (*Mustela frenata*) 6
- (4a) Same sex or total length less than 350 mm (13.7 in.) short-tailed weasel (*Mustela erminea*) 7

- (5) Total length over 800 mm (31 4 in.)—fisher (*Martes pennanti*)  
 (3a) Size smaller total length less than 800 mm (31 4 in.)      8  
 (6) Fur large (Figure 48a) throat orange (usually)—marten (*Martes americana*)  
 (7a) Large ears, (Figure 48b) chin and throat often with white patches—mink (*Mustela vison*)



Figure 48 Head of (a) marten showing large ears, and (b) mink showing small ears

#### Marten. *Martes americana* Turton

**Diagnosis.** Size, male, total length 596-663 mm (23·5-26 in.); tail 181-223 mm (7·08-8·75 in.); hind foot 95-109 mm (3·7-4·3 in.); female considerably smaller, size varies with the subspecies, a medium-sized, slender-bodied, short-legged, bushy-tailed (in good pelage) tree weasel, colour varies with the race and the season, in general yellowish brown, brown or greyish brown with orange tinges, darker posteriorly, on tail, and on legs much the same below but with an irregular shaped yellow or white to orange patch on chest.

**Geographical Variation.** The following three subspecies occur

(1) *Martes americana abieticola* Preble. Total length 640 mm, tail 210, hind foot 95 (type, Preble), average of six skulls, Oxford House, Man. occipitonasal length 78·9, zygomatic breadth, 47·8 (Preble) a rich dark yellowish brown animal, in winter pelage, includes the animals from northeast Alberta.

(2) *Martes americana abietinoides* Gray. Total length 596 mm (tail 181, hind foot 96 (in Banff male), a small dark brown form includes the animals of the Rocky Mountains.

(3) *Martes americana setacea* Osgood. Total length 665 mm (tail 223, hind foot 109) average four adult males, Fort Yukon Osgood; a large pale brownish or greyish race includes the northwestern Alberta animals.

*Distribution in Alberta.* In the northern and western coniferous forests.



Figure 45. Marten

*Life History.* Active throughout the year, arboreal and terrestrial; food chiefly small mammals; mates in July and August, 1 to 4 young born the following April, may breed the second summer but may not breed until the third summer; young weaned at 6 to 7 weeks (for *M. caurina*).

**General** In the forests of the mountains where the marten enjoys protection they are still very common. A H Lang saw one that at his approach ran up a tree and sat there only a few feet from him, scribbling a "step" at intervals until he was tired of watching it and left. Mr P U Lacasse of Banff Park has them come about his dwelling in winter, they take meat from his hand and come into his summer kitchen through a hole in the wall.



Figure 30. Marten paws (1-cm. skin)

This was one of the common, important fur bearers when the country was new and it is still important though much less common. When abundant there were marked cycle fluctuations in numbers but these are less evident now, rather the following table shows a progressive decline in the take.

The annual total value of the marten taken in Alberta in the period 1919-20 to 1937-38 has varied between \$5,068 and \$248,151; the average value per pelt has varied annually from \$11.50 (1934-35) to \$41.66 (1919-20).

The Alberta marten yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	5,956	1930-31	806
1920-21	4,255	1931-32	614
1921-22		1932-33	382
1922-23	4,603	1933-34	532
1923-24	3,968	1934-35	574
1924-25	3,045	1935-36	91
1925-26	3,248	1936-37	636
1926-27	2,069	1937-38	473
1927-28	1,388	1938-39	
1928-29	1,650	1939-40	
1929-30	1,033	1940-41	18
		1941-42	.

#### Reference

Marking and Bowerit, 1942. Amer. Midl. Nat., 28, pp. 694-695 (tail in captivity).

#### Fisher. *Martes pennanti* Erxleben

**Diagnosis.** Size: male length about 1,016 mm. (40 in.); tail 406 mm. (16 in.); female smaller, a moderately slender, short-legged tree wasser, colour generally dark brown, grizzled greyish anteriorly, blacker ventrally, on legs and on tail.

**Geographical Variation.** Skull measurements show that fisher from western Canada are slightly larger than those from eastern Canada, and the following name is used for Alberta animals: *Martes pennanti columbiana* Goldman.

**Distribution in Alberta.** Formerly northern and western Alberta in the coniferous forests, now scarce and unreported from many areas.

**Life History.** The 1 to 5 young are born in spring, and the females mate again almost at once. Food apparently any small animals, rabbits being one of its favourites, it is well known as an eater of porcupines, and is said to kill, at times, foxes, lynx, and even deer.



**General.** The heavier coniferous forests, especially in damper areas, seem to be the favourite habitat of this animal. Seeger writes that formerly the species was fairly numerous and generally distributed throughout all suitable areas in Wood Buffalo Park, but it had become so scarce that in his 2 years' residence in the park not a single well supported record of its occurrence came to his notice.



Figure 51. Fisher

This is one of our fine furs, but the number of fisher taken is so small that it is not now of great importance as a fur bearer. Though the total fisher yield is only a small part of the total fur catch, the value of individual skins is such that a small increase in the number of skins taken would mean a large increase in the value of the catch. The animal is worth strenuous efforts to increase its numbers.

The total annual value of the fisher taken in Alberta in the period 1919-20 to 1938-39 has varied from \$18,120 in

1919-20 and \$11,460 in 1925-26 to \$200 in 1932-33, the annual average value per pelt has varied from \$40 to \$83.12.

Alberta fisher yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	218	1930-31	17
1920-21	121	1931-32	22
1921-22		1932-33	4
1922-23	77	1933-34	21
1923-24	83	1934-35	48
1924-25	78	1935-36	61
1925-26	194	1936-37	37
1926-27	90	1937-38	17
1927-28	62	1938-39	
1928-29	38	1939-40	
1929-30	25	1940-41	
		1941-42	

#### References

- Ha. 1942 Calif. Fish and Game, 18, pp. 143-147 (breeding data)  
 Rand, 1944 Can. Field-Nat., 58, pp. 77-81 (status)  
 Soper, 1942 Jour. Mammal., 23, 127, (in Wood Buffalo Park)

#### Least Weasel. *Mustela nreosa* Bangs

**Diagnosis.** Male, total length 198 mm (7.7 in.), tail 32.5 mm., hind foot 21 mm., female, total length 188, tail 31.5 hind foot 21 (Saskatchewan specimens), body slender, legs short tail short colour in winter white above and below, in summer brown above, white below no black tip to tail summer or winter though a few black hairs are often present in the tip of the tail.

**Geographical Variation.** Specimens are referable to *Mustela nreosa nreosa* Bangs.

**Distribution in Alberta.** The northern and central part of the province generally rare but apparently fairly common locally in the park lands.

**Life History.** Changes colour from brown in summer to white in winter, 4 to 6 young, feed, mice, and perhaps many insects.

**General.** The least weasel is our smallest carnivore. The Cruddles, in Manitoba write that the least weasel is such a midget that it usually passes unnoticed unless caught in a trap. It is apparently an efficient mouser, for

they write of it destroying the inhabitants of nests of meadow mice, and taking possession of the nests. One such nest was occupied by a weasel for about 2 weeks, during which time it was observed that several mice had been carried over the snow to the home. This mouse nest was examined in April and in it were discovered six dead lesser meadow mice, one red-backed mouse, the head of another and at least six or eight other remnants, including Drummond meadow mouse, these last remains being indicated chiefly by the hair lined nest of the weasel.



Figure 52 Upper figure least weasel, middle figure tail of short-tailed weasel, lower figure tail of long-tailed weasel

The scarcity of this small weasel, its small size, and the lack of a white tip to the tail are all probably reasons for its rarely appearing in the fur trade.

#### References

Croftie, 1925 Can. Field-Nat., 39, p. 142 (habits, Manitoba)

### Short-tailed Weasel. *Mustela erminea* Linnaeus

**Diagnosis.** Total length 291 to 316 mm. (11.4-12.4 in.) tail 85-86 mm. 3.3 in.; hind foot about 40 mm., varies with the subspecies, female considerably smaller and slender, legs short to cylindrical seasonally dimorphic, colour in winter all white sometimes yellowish; stained with a black tip to the tail colour in summer or fur is brown above white below, tail brown tipped with black.

**Geographical Variation.** The animals from southern Alberta are smaller than those from the northern part of the province allowing two races to be distinguished.

(1) *Mustela erminea richardsoni* Bonaparte. Male, total length 316 mm., tail 85 hind foot 40 (average three males Wood Buffalo Park, Soper), the northern part of the province.

(2) *Mustela erminea aurata* Hall. Males total length 291 mm., tail 86 hind foot 39.9 (average ten males Idaho, Argona description female total length 256 tail 71 hind foot 32.3 (average five females Idaho original description) a smaller race with lighter skull the southern part of the province north to Red Deer River as to the headwaters of Smoky River.

**Distribution in Alberta.** Recorded as occurring throughout but probably absent from most of the drier plains of the southeast, apparently even in prairies, very common some years in wooded and semi-wooded country.

**Life History.** Changes colour from white in winter to brown in summer mates in summer 4 to 9 young born the following spring, food chiefly small mammals.

**General.** Restlessness and astounding energy are keynotes of the weasel's temperament. It is epitomized in the saying, as well try to catch a weasel asleep in reference to something almost impossible of accomplishment.

Forest, bushy and, adjacent grassland are the weasel's favourite haunts. In northern Alberta Soper estimates that the population may be ten to the square mile in years of plenty. This weasel belongs to the same

species as does the old world ermine and these are the animals whose white winter pelage with black tipped tail provides the fur called ermine the badge of royalty)

The annual total value of the weasel taken from Alberta in the period 1919-20 to 1941-42 has varied between \$45,096 and \$684,150, the average value per pelt has varied annually from 47 cents (1934-35) to \$1.75 (1926-28)

The Alberta weasel yield is as follows

Year	No. of pelts	Year	No. of pelts
1919-20	68,938	1930-31	119,827
1920-21	85,176	1931-32	202,091
1921-22		1932-33	267,461
1922-23	72,260	1933-34	198,942
1923-24	57,962	1934-35	127,383
1924-25	60,160	1935-36	215,000
1925-26	113,647	1936-37	371,459
1926-27	94,105	1937-38	136,519
1927-28	109,687	1938-39	208,043
1928-29	267,875	1939-40	396,770
1929-30	182,204	1940-41	181,133
		1941-42	526,299

This includes the less numerous and more valuable pelts of the long-tailed weasel

#### References

- Hall, 1945 Jour. Mammal. 26, pp. 175-182 (taxonomy)  
 Hamilton, 1933 Amer. Midl. Nat., 14, pp. 289-378 (habits in New York State)  
 Soper, 1919 Can. Field-Nat. 33, pp. 43-47 (habits in Alberta)

#### Long-tailed Weasel. *Mustela frenata* Lichtenstein

**Diagnosis.** Male, total length 450 mm. (17.7 in.), tail 155 mm. (6.1 in.), hind foot 30 mm. (1.9 in.), female, total length 380 mm. (14.9 in.), tail 130 mm., hind foot 46 mm. (Ls.ay specimens, Soper), body slender, legs short, tail cylindrical, rather long, colour in winter, white above and below, sometimes tinged yellow, on tip of tail black, in summer uniform pale brown above, white below, tail tipped black.

**Geographical Variation.** Specimens are referable to *Mustela frenata longicauda* Bonaparte

**Distribution in Alberta.** Central and southern Alberta, including the eastern slopes of the Rocky Mountains.

**Life History.** Colour changes by month from white in winter to brown in summer. 4 to 8 young born in a nest in some burrow or other shelter, in the spring, food chiefly mammals and birds.

**General.** The weasels chosen field is the open prairie where they wander great cally from place to place visiting well willow clumps, gopher holes, odd stones, open bluffs and any other irregularities that appear in the line of travel. They are common on the prairie but their presence, unless visible, is not much noticed until open country and their tracks reveal their presence. Soper has spent many hours upon their trails and found these weasels to travel throughout the hottest weather. Red squirrels and mink suspected their activity during the strong cold but weasels travel in the coldest and, at times, nights over the blakest and most exposed ranges. Although their wanderings seem the most erratic and inconsistent imaginable there is in it a sort of method and they return again and again over the same route. Soper.

In the plains and edge of the park lands this is probably the most unskilled weasel as a fur bearer but the fur traders include them with the short-tailed weasel and it is impossible to separate the data.

#### References

- Croble 1923 Can. Field Nat. 29, pp. 142-45, notes on Manitoba.  
Hamilton 1902 Amer. Mus. Nat. Hist. 14, pp. 299-373, habits and economic status in New York.  
Soper 1919 Can. Field Nat. 23, pp. 43-47, habits.  
Soper 1921 Can. Field Nat. 25, p. 109 (habits and life).

#### Mink. *Mustela vison* Schreber

**Diagnosis.** Total length 560 mm. (22 in.) tail 190 mm. (7.5 in.) hind foot 67 mm. (2.6 in.) type of *lacustris* Preble, body slender, legs short, tail bushy, colour above and below dark brown with a white area on throat.

**Geographical Variation.** The mink of Alberta have been variously listed as *Mustela vison europaeus* Bangs, *Mustela vison vison* Schreber and *Mustela vison lacustris* Preble. Anderson lists them all as *Mustela vison lacustris* Preble to which the above measurements apply.



I caught several large lake trout in the eddy at its foot. These I sced among the boulders on the shore as fast as I secured them. On gathering the fish I rushed on and after a short search found it partly submerged beneath a log where it had been dragged by a mink which was still engaged with it. I set a small steel trap on a log holding it by the chain with one hand I seized the fish by the tail and gently set the mink into the trap.

Mink pelts have long been one of the staple furs.

The total annual value of the mink taken from Alberta in the period 1919-20 to 1942-43 has varied between \$19,626 and \$1,723,331.95. The average value per pelt has varied annually from \$3.58 (1931-32) to \$15 (1926-29).

The Alberta mink yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	9,946	1931-32	3,485
1920-21	8,943	1932-33	8,559
1921-22		1933-34	9,237
1922-23	14,963	1934-35	9,274
1923-24	20,294	1935-36	12,145
1924-25	11,928	1936-37	11,367
1925-26	7,104	1937-38	13,893
1926-27	2,234	1938-39	30,719
1927-28	1,704	1939-40	59,758
1928-29	2,672	1940-41	74,270
1929-30	2,437	1941-42	76,090
1930-31	3,235	1942-43	134,127

The above figures evidently include both ranch raised and wild caught mink. Mink have proved to be one of the few wild fur bearers that can be successfully ranched. In Alberta the number of mink ranches has increased steadily from 35 in 1929 to 772 in 1943 with 86 additional ranches raising both mink and foxes. The pelt production from mink ranches was 250 pelts in 1929, in 1943 it was 106,179, with a total value of \$1,152,042.15.

#### References

- Sealander J. A. 1943 *Four Wild & Menag. I.* pp. 411-417 (winter food in Michigan meadow most important individual prey, cotton-tail second meadow mouse third).  
 Sauer 1943 *Four Mammals* 23 pp. Pls. 120



**Black-footed Ferret.** *Mustela nigripes* Audubon and Bachman

**Diagnosis.** Male total length 512 mm. (20 in.), tail 120 mm. (4 7 in.), and foot 58 mm. (Saskatchewan specimens); body fairly slender; legs short; tail moderate cylindrical; colour above generally yellowish white with many grey, hairs tipped with yellowish brown, centre of back more brownish; a band across eyes, feet, and legs, and tip of tail black; in aspects white.



FIGURE 34. Black-footed ferret

**Geographical Variation.** No subspecies are recognizable, as the species is known by the binomial *Mustela nigripes* Audubon and Bachman.

**Distribution in Alberta.** The southern plains.

**Life History.** Little known; said to be closely associated with prairie dogs, which are thought to be their main food.

**General.** Throughout its range the black footed ferret is usually recorded as seen in or about prairie dog "towns", as the colonies are called. As prairie dogs are absent from Alberta, the occurrence of this weasel may be looked on as accidental.

*References*

Badley 1920. No Amer Fauna, No 49, pp 171-172, general.

Subfamily *Cyoninae*     *Wolverine*

This subfamily not recognized by many authors but included with the Mustelinae has a northern distribution in the boreal forests of both the old and the new world. A number of species have been described all apparently closely related if not conspecific.

Only one form occurs in Alberta.

**Wolverine.**     *Gulo luscus* Linnaeus

**Diagnosis.** Male total length up to 1070 mm (42 1 in.), tail 218 mm (8 5 in.), hind foot 190 mm (7 5 in.), weight 36 pounds (a large male from Alaska Barley), body stout and short, legs short, tail short and bushy, color variable from brown to nearly black above usually with a broad yellow or creamish stripe along each side, meeting over hips, underparts yellowish, crown grey, extremities black, inferiors dark or ashy white or yellowish on throat and chest.

**Geographical Variation.** The population is referred to the following subspecies: *Gulo luscus luscus* Linnaeus.

**Distribution in Alberta.** The forests of the north and the mountains of the west.

**Life History.** Two to three young born in some sheltered cavity, gestation period reported as 60 days by earlier writers up to 183 days by later ones, food small and large animals including occasional mouse and caribou, carrion, it frequently robs caches and trap-lines, captives may live to 15 years, age and average length of life in captivity is 5½ years.

**General.** The wolverine has by tradition become a symbol of destructiveness, and is widely execrated as a robber of trap-lines and a despoiler of caches and cabins. Anderson writes that the Indians and Eskimo and most white men residing in the north generally come to look upon a certain amount of depredation by wolverines as unpreventable, fated and like the annoyance of mosquitoes taken as a matter of course.

Though, sometimes included with species that are considered in danger of extermination the wolverine is fairly common over a wide range in Canada and is in no immediate danger of extermination.

As a fur producer in Alberta the wolverine is not important because of the small catch.



Figure 55. Wolverine

The annual total value of the wolverine taken from Alberta in the period 1919-20 to 1941-42 has varied between \$22 and \$5 640 the average value per pelt has varied annually from \$2 (1933-34) to \$20 (1927-28).

The Alberta wolverine yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	181	1929-31	19
1920-21	107	1931-32	6
1921-22		1932-33	14
1922-23	129	1933-34	11
1923-24	230	1934-35	69
1924-25	334	1935-36	33
1925-26	203	1936-37	17
1926-27	354	1937-38	20
1927-28	66	1938-39	21
1928-29	282	1939-40	23
1929-30	32	1940-41	26
		1941-42	11

#### References

- Anderson 1913. In *Profession's "My Life with the Eskimo"* (general).  
 Henderson and Craig 1932. *Fennoscandian Mammalogy* (Good).

Kenneth 1943. *Casts and Periods*.

Series 1929. *Lives of Great Animals* (general).

Vol. 1944. No. 341. No. 23 p. 108 (age reached in captivity).

### Subfamily—*Lutrinae*. Otters

The otters are adapted for an aquatic existence and are expert at swimming and diving, catching fish in their native element. Their distribution is widespread over the Americas, Europe, Asia and Africa. Otters have been trained and make excellent pets. In the Orient they are trained and used in driving fish into nets, and also to swim and catch fish for their masters.

Only one species occurs in Canada.

#### Otter, *Lutra canadensis* Schreber

**Diagnosis.** Length up to 1,220 mm (48 in.) to 1,482 mm (59 in.) weight estimated at 25 pounds (female somewhat smaller). Hairs for *L. canadensis* body slender, tail strong and tapering, legs short, fur short dense, color is dark brown, paler below, with greyish buff on cheeks and throat.



Figure 56. Otter.

**Geographical Variation.** Otter from Alberta have been referred to *L. canadensis* and *L. pebbles* but only the following subspecies is recorded for Alberta by Anderson: *Lutra canadensis pebbles* Goldman. However, specimens from the southern part of the province may prove to represent a different southern race.

**Distribution in Alberta**—Rare in the north, of doubtful occurrence in the south.

**Life History**—Two to four young born in the spring after a 49- to 62-day gestation period (most usually fish and other aquatic animals also small mammals and birds).

**General**—From the adjacent Mackenzie district Prober writes of otters "when pressed they swim together beneath the surface rising at intervals to breathe and re-commence. On first reaching the surface the animal raises its head about a foot above the water to survey the situation. After remaining a few seconds in this position it sinks and only the head remains in sight while it regains its breath remaining unseen for some seconds. It then dives again especially if hard pressed and swims for a distance of 200 yards or more before reappearing, usually in an unexpected direction. If the animal is wounded it raises only the head above the surface and in this position usually escapes detection if there be ever so slight a ripple on the water.

All otters are most at home in the water they come ashore to eat their prey, spend considerable time on the stream banks and make long trips overland from waterway to waterway.

The annual total value of the otter taken from Alberta in the period 1919-20 to 1941-42 has varied between \$1,200 and \$9,175; the average annual value per pelt has varied from \$10.62 (1937-38) to \$30 (1927-30).

The Alberta otter yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	298	1930-31	163
1920-21	292	1931-32	140
1921-22		1932-33	156
1922-23	264	1933-34	160
1923-24	267	1934-35	98
1924-25	232	1935-36	151
1925-26	270	1936-37	178
1926-27	200	1937-38	207
1927-28	149	1938-39	198
1928-29	229	1939-40	169
1929-30	145	1940-41	124
		1941-42	69

Source: A.

## References

- Bauer, 1926 No Amer Fauna No 45 (general)  
 Kennel & 1943 Gestation Periods  
 Preble 1906 No Amer Fauna No 37 (p 228 229 = Achubaska-Mackenzie area)  
 Seton, 1929 Lives of Game Animals (general)

## Subfamily Urophelinae Skinks

This is a strictly American group occurring only in North and South America. Its members are notorious for the strong-smelling fluid that is secreted by a pair of anal glands. This secretion can be sprayed at will and is used as a weapon of defence. The odour said to of the skunk has become proverbial though many others of the weasel family have a similar odour and in some it appears to be nearly as powerful.

The skinks are terrestrial animals that have their front claws modified for digging. They are slow moving animals and feed on a variety of animal and vegetable food including many insects.

Only one species occurs in Alberta.

Skunk, *Urophis urophis* Schöcher

*Diagnosis.* Total length 660 mm. 25.9 in.; tail 250 mm. (9.8 in.) and feet 88. a Wood Buffalo Park male. Squar. body stout tail long and bushy colour generally black with a white patch on nape and from this extending down each side of the back a white stripe of varying width tail usually white and black. In eastern Canada skinks with little white on them are not uncommon but are rare or absent in Alberta.

*Geographical Variation.* In Alberta specimens are referable to *Urophis urophis auduboni* Richardson though there are some discrepancies (Crowe).

*Distribution in Alberta.* Common from the southern border to Wood Buffalo Park.

*Life History.* Hibernates in burrows in winter, 2 to 10 usually 6 to 8 young born in spring a 42- to 63-day gestation period food chiefly insects more and berries refuse is relished.

*hairs of*. The skunk is an adaptable creature common in the forests of Wood Buffalo Park and on the sand prairie near Milk River. It sleeps in its burrow during the day and at dusk sallies forth. Where garbage is abundant the skunk is fed as at Waterton Lakes, it is glad to fight to feed, paying little attention to snatching humans. I observed that walk or tread slowly induces this glib behavior with the drooping but not slumped tail. The ~~tail~~ <sup>tail</sup> is up like a warning yeller and the skunk proceeds to open the strong smelling bagel from its anal glands that is its chief defense. Sometimes it will make a short dash toward an intruder, stamp its feet, perhaps as an additional warning but it is usually better to let it go, its main defense is its smell.



Figure 1. Skunk

The annual total value of the skunk taken from Alberta in the period 1919-20 to 1941-42 has varied between \$4298 and \$89826, the average value per pelt has varied annually from 60 cents (1932-33) to \$3.41 (1919-20).

The Alberta stock yield is as follows:

Year	No. of pelts	Year	No. of skins
1919-20	3,253	1930-31	6,673
1920-21	3,462	1931-32	4,857
1921-22		1932-33	5,846
1922-23	7,439	1933-34	27,163
1923-24	7,733	1934-35	20,343
1924-25	6,479	1935-36	13,334
1925-26	5,795	1936-37	23,789
1926-27	3,573	1937-38	12,744
1927-28	3,507	1938-39	14,710
1928-29	5,953	1939-40	27,432
1929-30	6,275	1940-41	17,513
		1941-42	33,999

#### References

- Crowe 1943 Bull Amer Mus Nat Hist 80, p. 396 (taxonomy)  
Hall 1938 Carnegie H. Wash. Pub. No. 473 pp. 43-119 (taxonomy)  
Soper 1912 Jour Mammal 22, pp. 129, 136 (Wood Buffalo Park)

#### Subfamily—*Taxidea* American Badgers

Though with very heavy lateral claws on the front feet, the badger spends much of its time on the surface of the ground. The badgers of the old world though similar in external appearance and general habits to those of the new world are put in a separate subfamily on anatomical grounds.

Only one species occurs in Canada

#### Badger: *Taxidea taxus* Schreber

**Diagnosis.** Total length 880 mm. (34 6 in.) tail 150 mm. (4 5/8 in.) hind foot 110 mm. (7 4/10 in.) (Alberta specimen) body stout, flat, legs short, front claws very long and heavy, tail short, colour above grizzled grey, more rusty posteriorly, muzzle to top of head brown or blackish, divided by a median white stripe that continues back to the shoulders, side of head white with a blackish mark on each side of the head (Figure 58), underparts white or whitish.

**Geographical Variation.** The Alberta form is the nominate subspecies *Taxidea taxus taxus* Schreber.



*Distribution in Alberta*—Common on the southern plains and into the edge of the mountains north rarely to the Athabasca.

*Life History*—Young born in a burrow made by the badger after a gestation period of about 183 days feed on such mammals especially ground squirrels.

*Character*—The skins and grass are of the south are the badger's home. Often it is also seen in hay stacks in the field and its strong front teeth turn a corner. On short legs it travels at a faster than a man's walk and it gives the impression of being a definite business. Its way of traveling, how to be greeted seems to flow along with a succession of ripples passing from nose to tail. It purrs at any gasp if pressed it may take refuge in one of the burrows and at a walk seem at hand. If one looks out the burrow after it, he as he will find the animal and if the badger peering out at a man to be turned with a gasp and then at the burrow's entrance gets at the entrance starting at as the badger digs down working for safety. Then it retreats and watches from a little distance in a few moments the badger's head appears and shortly the animal comes out again and sets off at a jog-trot over the plains.



FIG. 26. Badger head.

Where there are badgers the burrows they have made are common, for these animals feed on ground squirrels, which they get by digging down after them. On the plains it is the Richardson ground squirrel, in the woodlands it is the Columbian ground squirrel. In the edge of the mountains near Banff where ground squirrels are

common in some valleys badgers may move in raise a family and nearly extirpate the local ground squirrel population. With the ground squirrels gone the badger moves on and for a season or two the little valley may remain unoccupied by badgers until the ground squirrel

population increases again. In the bushlands and long grass country riders dislike the badgers for there the burrows are not easily seen and horses step into them and riders are the woe. But in the short grass plains country where the burrows are easily seen and mounted riders give them little thought.

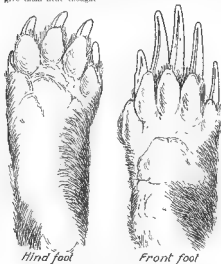


Figure 50 Badger foot

Thus the attitude toward the badger varies. In parts of Alberta it has been treated as vermin. In parts it is accorded protection as a fur bearer. Over much of the

plains it is one of the few fur bearers that along with the long-tailed weasel, the skunk, coyote and jack rabbit, yield their pelts to the part-time trapper.

The total annual value of the badger taken from Alberta in the period 1922-23 to 1941-42 has varied between \$311 and \$384,252 the average annual value per pelt has varied from 92 cents (1920-21) to \$22 (1936-37).

The Alberta yield is as follows:

Year	No. of pelts	Year	No. of pelts
1922-23	781	1930-31	3,689
1923-24	219	1931-32	2,253
1924-25		1932-33	1,068
1925-26	1,103	1933-34	1,220
1926-27	1,778	1934-35	1,101
1927-28	3,008	1935-36	130
1928-29	5,548	1936-37	35
1929-30	10,582	1937-38	76
1930-31	15,919	1938-39	24
1931-32	17,408	1939-40	59
1932-33	6,003	1940-41	3,150
		1941-42	5,004

#### FAMILY—CANIDAE DOGS AND THEIR RELATIVES

The dog family which includes the foxes, wolves, coyotes, jackals etc., has a cosmopolitan distribution, though in some areas, such as Australia, the wild dog or dingo may owe its presence to early human introduction.

In Canada there are represented four genera and six species, of which three genera and five species occur in Alberta. These wolves and foxes are carnivorous animals, carnivorous in diet, largely nocturnal, but often abroad by day the young are born in a helpless condition in some burrow and usually both male and female bring them food for some time before they leave the nest and hunt in a pack with the parents.

Colour phases are common in the wolf, the red fox, and the arctic fox, and are so different in some cases that they have received different vernacular names.

Some of the northern species, such as the timber wolf and the arctic fox, occur in both the Old and the New World, and the red fox of the Old and the New World are so similar that it has been suggested that they are probably the same species though usually kept separate.

The domestic dog, though most closely related to the timber wolf, still has its exact origin clouded in obscurity. Probably it was in Asia.

#### Reference

Allen, 1949-1950. *Man. Comp. Zool.*, vol. 43, pp. 431-517, *Dogs of the American Hemisphere*.

#### KEY TO SPECIES

- (1) Tail with distinct white tip—red fox (*Vulpes fulva*)
- (1a) Tail without stripe defined white tip 2
- (2) Size small, body length less than 900 mm. (35-4 in) 3
- (2a) Size larger, body length more than 1,000 mm. (39-36 in) 4
- (3) Pelage grizzled top of tail black—kit fox (*Vulpes velox*)
- (3a) Pelage uniform white or smoky grey—grey fox (*Alopex lagopus*)
- (1) Tail length 1,300 mm. (51 in) or less—canine (*Canis latrans*)
- (2a) Tail length 1,500 mm. (59 in) or more—wolf (*Canis lupus*)

#### Red Fox. *Vulpes fulva* Dromsted

(Coloured Fox Silver Fox Black Fox Cross Fox)

**Diagnosis:** Total length 1,015-1,125 mm. (40-44 in); tail 420-461 mm. (16 5/8-18 1/2 in); hind foot 170-195 mm. (6 6/8-7 6/8 in); female slightly smaller than male, slender dog-like, with a big bushy tail, especially in winter, colour varies greatly, generally yellowish red with backs of ears and ankles black and tip of tail white. Four main types or colour phases are usually recognized and in the fur trade are given different names: red fox, pelage generally yellowish red; cross (or patch) fox, generally yellowish but with black in the pelage tending to form a cross-shape mark or patch on the shoulder (hence the name); silver fox, generally black with many silver-tipped hairs; and black fox with pelage generally black. However examination of large series of skins has shown that there is intergradation between the extreme conditions, and there are specimens that it is difficult to assign to one or another colour phase. Three colour phases, red, cross, and silver, have been seen in one litter. In addition, various other

varieties have been developed on fur farms, including the platinum and various white-spotted phases. The Samson fox is a freak, in which, the guard hairs are lacking



Figure 40 Coloured or red fox

*Geographical Variation.* Bailey considers all the red foxes of North America to belong to one species, and this is possibly conspecific with the Old World red fox. In Alberta the following subspecies are recorded:

(1) *Vulpes fulva macroura* Bailev. Total length 1015 mm. (tail 461 hind foot 172 (Bailey 1926), a large, long-tailed light vesvous fox. Occurs in the west in the Rocky Mountains.

(2) *Vulpes fulva albertorum* Merriam. Male total length 1125 mm. tail 440 hind foot 195 (Wood Buffalo Park Super), with a light slender skull. It occurs in northwest Alberta.

(3) *Vulpes fulva regalis* Merriam. Total length 1,117 mm. tail 420 hind foot 170 (type Bailey 1926), a large red fox with long tan erge ears, golden-yellow colour, paler on rump and face, much black on legs and tail. Occurs in eastern Alberta.

*Distribution in Alberta.* Widespread throughout, but very rare in the southern plains.

*Life History.* The 3 to 9 young, born in spring after a 48- to 56-day gestation period remain in and about the

den until mid-summer being cared for by both parents. The staple food is probably small mammals in which, mice, ground squirrels, and rabbits predominate, but many other items such as birds and fruit are eaten.

**General.** The fox is an agile, graceful creature with a cunning that has given it a place in folklore.

Soper writes that in Wood Buffalo Park it is one of the commonest mammals, and ranging everywhere occurs in astonishing numbers in peak years. Several trappers single-handed took from 75 to more than 100 pelts in the season of 1932, and 1933 was a peak year. Indirectly, he says that foxes were especially numerous where migrant bison-grazing caribou were common. It is said that foxes visit the kills made by timber wolves to eat the remains left by the wolves.

Foxes have periods of plenty, and periods of scarcity. There have been attempts to show that these correlate into widespread cycles, but there is some evidence to show that these fluctuations are local in extent, and not synchronized over a wide area. MacFarlane has pointed out that in the Northwest Territories the fur return has been cyclic in the latter part of the last century, and the table given below of recently taken furs also shows pronounced variation.

The annual total value of the red fox (red phase) taken from Alberta (presumably mostly wild caught) in the period 1919-20 to 1941-42 has varied between \$10,557 and \$212,760; the annual average value per pelt has varied from \$5.52 (1939-40) to \$30 (1927-30).

The Alberta red fox yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	477	1930-31	2 411
1920-21	1,208	1931-32	4,047
1921-22		1932-33	7,319
1922-23	4,083	1933-34	12,385
1923-24	11,541	1934-35	12,808
1924-25	14,184	1935-36	7,816
1925-26	11,326	1936-37	2 490
1926-27	5,085	1937-38	1,271
1927-28	1,289	1938-39	1,779
1928-29	1,448	1939-40	2 186
1929-30	1,674	1940-41	3,269
		1941-42	14,780

MacFarlane writing of the 20-year period 1858-77 says that the Alaskan district contributed 6 582 red 4 852 cross and 1 450 silver fox pelts. No recent data is available on the frequency of the various colour phases in the wild.

The silver fox was at one time extremely costly as a pelt and has led to growing them in captivity. Now the silver fox is marketed in Alberta (presumably mostly from farms) as well as the red fox pelts (presumably mostly as taken in trapper). In the period 1932-1942 the number of silver fox pelts produced annually in Alberta varied from 9,942 to 26,142 and in total value from \$198,840 to \$482,408. With a population of a raccoon-raised supply the very high price has dropped. In 1929 the average value was \$193.38 per skin, in 1930 it had dropped to \$75 and in the 10 years 1932-1942 the average annual value has varied from \$11.37 to \$34 a skin.

#### References

- Baker 1906 *Nature Magazine* 28 pp. 269-272, 317 (note of a fox-killer)  
 Cross 1940 *Jour. Mammals* 21 pp. 294-306 (fluctuations in Ontario)  
 Cross 1941 *Jour. Mammals* 22 pp. 45-46 (colour phase)  
 MacFarlane 1905 *Proc. L.S. Nat. Mus.* 28 pp. 792, 794 (fluctuations and colour phases)  
 Merriam 1900 *Proc. Wash. Acad. Sci.* 2 pp. 661-676 (captive)  
 Sage 1942 *Jour. Mammals* 23 p. 130 (Wood Buffalo Park)

#### Kit Fox, *Vulpes velox* Say

(Also called Prairie Fox)

**Diagnosis.** Total length 844 mm (33 in) tail 312 mm (12 in), hind foot 130 mm (5.1 in) (type of hebra). A very small fox above dark yellowish grey grizzled, sides brighter, legs and underparts buffy, tip of tail and sides of nose black. Ear long in winter short in summer.

**Geographical Variation.** The Alberta animals are referable to *Vulpes velox hebes* Merriam.

**Distribution in Alberta.** The southern plains, once common, now almost extinct.

**Life History.** Five young born in a den in spring (Seton), food probably small mammals and insects.

*General.* The story heard from the older plainsmen is the same all over southern Alberta. 20 to 30 years ago or more these little furs were common. When the cattle men were camped out on the round-up the hold, machievous, little chaps would come in a camp at night and chew up straps and saddlery.

Now they are practically gone. Probably the campaign with poison against wolves and coyotes had a great effect on these hold unsuspicious animals. Bailey writing of North Dakota says they were very easily trapped, poisoned or caught by traps so that they did not last long after the country became settled.

The kit fox used to supply some pelts to the fur trade. MacFarlane writes that in the period 1863-1877 the Hudson's Bay Company sold in London 117,025 pelts. Seton records that at L. Simpson's sale in London in March 1906 1,404 pelts were sold at prices ranging from about 30 cents to \$1.32. No kit foxes are listed in recent fur returns though Seton assumes that "fox fur" is equivalent to kit fox.

Any information on the occurrence of kit foxes is worthy of record and any specimens should find their way to a Museum, but it must be kept in mind that a fox kit (i.e. a young fox) is not necessarily a kit fox.

#### *References*

- Bailey 1926. No Amer. Fauna. No. 49. pp. 161-165 (habits and status, North Dakota).  
 Fowler 1907. Can. Field Nat. 51, pp. 15-16 (former occurrence at High River).  
 MacFarlane, 1906. Proc. U.S. Nat. Mus. 28, p. 704 (fur data).  
 Seton, 1929. Lives of Game Animals (general).

#### *Arctic Fox. Alopex lagopus* Linnaeus

(The white colour phase is called White Fox, the blue colour phase Blue Fox)

*Diagnosis.* Total length 845 mm. (♂3 ad.) tail 320 mm. (12.5 in.); hind foot 136 mm. (5.4 in.) (Mackenzie specimen). A rather small fox, muzzle rather blunt, ears small, pelage long in winter soles of feet well furred, in summer pelage rather greyish or sooty brown, paler below, in winter pelage usually pure white, but in the



Canadian arctic & 'blue' colour phase in which the pelage is generally smoky grey & occasionally fawn. The proportion of blue foxes varies locally in Canada, but is usually less than 2 per cent.

*Geographical Variation.* The subspecies of this circumpolar species represented in Alberta is *Alopex lagopus minimus* Merriam.

*Distribution in Alberta.* Wanders from the barren grounds into the northeast corner sporadically in winter (Soper).

*Life History.* Young up to 10 (or 20?), in number born in a burrow after gestation period of about 60 days, feed on small animals, birds and their eggs, fish, berries, and the leavings of wolf and polar bear kills.

*General.* The arctic tundra and the coasts of the Arctic Ocean are the normal home of this fox. But in the years of plenty when these foods become very numerous, they spread southwards during the winter, and then some penetrate into the coniferous forests and they have been taken as far south as Athabasca.

#### Reference

Soper 1942. *Four Mammals* 22, p. 131 (occurrence in Alberta).

#### Coyote, *Canis latrans* Say

*Diagnosis.* Total length 1072-1219 mm. (42-148.2 in.) tail 256-304 mm. (10-12.5 in.), hind foot 178-200 mm. (7.7-8 in.) generally wolf like in appearance, but smaller with larger ears and more slender muzzle. Colour similar to that of some grey wolves, above mixed buffy, grey and black, below whitish, ears fulvous to buffy, tail with small black tip.

Bailey writes that in distinguishing a coyote from a wolf the nose, foot, and tooth measurements are sufficient. In the coyote the nose pad measures approximately  $\frac{1}{2}$  inch wide, the heel pad of front foot 1 inch wide and the greatest diameter of the canine tooth at base 0.3 inch.

*Geographical Variation.* In Alberta the following four subspecies are represented:

11. *Canis latrans latrans* Say. Size large: total length 1,219 mm. tail 394 head foot 179 skull, basal length 190 zygomatic breadth 109 (Merrill) in the parklands of central Alberta.

12. *Canis latrans lesteri* Merriam. Size large: next to latrans total length 1,116 mm. tail 320 head foot 200 in evident excess. Its extensive but slightly paler and skull and teeth same as skin. Basal length 170 zygomatic breadth 102 (Merrill) in Rocky Mountains on the west.

13. *Canis latrans not caninus* Merriam. Similar to lesteri but paler. Basal skull length 177 instead of 170 mm. skull basal length 177 mm. zygomatic breadth 103 (Merrill) in the parklands of the north.

14. *Canis latrans hesperus* Hall. A medium-sized variety: total length 1,099-1,072 mm. tail 255-307 head foot 181-178 (2 males) type from the Alberta. It is the above races of being more common in having one of black and white markings and without black on the fore legs (Hall).

*Distribution in the U.S.*—General. It is said that wolves have increased remarkably in abundance in the north in the last 40 years.

*Life History.*—Males return to their own haunts in May. 1 to 14, average about 81 young born in the spring after a gestation period of 60 to 64 days. As a course is suggested by the animals very rarely for a few parents for some time and probably more or less much afterwards. In the eggs care is especially large animals, deer antelope, live stock and some vegetable matter.

*General.*—The wolf on the prairie the way it is seen above by the hunting men or stalking ground squirrels. It is a species of the catching hold mouse. Walk the distance through the grass the mouse leaves a mouse perhaps by sound or scent. A few cautious steps to get nearer as it then bounds and the wolf lands with both front feet on the place where he thought the mouse was. A pause for perhaps the mouse has escaped the first bound perhaps it is still scurrying through the grass and another bound is necessary. Much has been said out this habit is distinctive and captive pups that have never seen a mouse will go through this behaviour pattern as play.

Sometimes during the day, but more often at night, the coyotes chorus of yelps and howls is heard, the eerie thrilling voice of the west.

The coyote is considered a predator whose numbers should be corbed and bounties have been put into effect in Alberta. In the early part of the year 1943 numerous complaints were received by the Alberta Government from sheep raisers that coyotes had increased to such an extent as to be a nuisance to the lamb crop. A bounty of \$5 (paid in part by the province under certain conditions) was put into effect, and in the period April 1, 1943, to March 31, 1944, bounties were paid on 4,554 coyotes. Most of these pelts were said to have been worthless summer skins.

The coyote is a fur bearer of some importance and any policy must always consider that, but the coyote has survived under settlement, increased its range despite persecution, and seems well able to care for itself.

The total annual value of the coyote take from Alberta in the period 1919-20 to 1941-42 has varied annually between \$28,803 and \$504,180; the average value per pelt has varied annually from \$5 (1934-35) to \$18 (1928-29).

The Alberta coyote yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	5,881	1930-31	10,488
1920-21	5,904	1931-32	10,990
1921-22		1932-33	11,544
1922-23	14,122	1933-34	15,586
1923-24	22,315	1934-35	28,476
1924-25	42,685	1935-36	27,841
1925-26	56,639	1936-37	25,279
1926-27	42,015	1937-38	19,484
1927-28	30,130	1938-39	15,919
1928-29	24,315	1939-40	15,259
1929-30	14,271	1940-41	13,786
		1941-42	18,763

#### References

- Criddle, N. and S., 1923. *Can. Field-Nat.*, 37, pp. 41-45 (habits in Manitoba).  
 Criddle, 1925. *Dom. of Can. Dept. Agr. Bull. (N.S.)* 13 (habits and economic status in Canada).  
 Goldman 1899. *Jour. Mammal.*, 11, pp. 325-334 (as a predator and the supposed ravages of the northwest).

Mem. Am. Mus. Nat. Hist., Vol. 13, pt. 10, 1904.

John 1986 Jan. Vancouver B.C. 23-26 lived in Montana and British Columbia.

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

**With Cindy Jane Lawrence**

14. *How much time do you spend on the Internet?*

*Phrynosoma* A long, slender animal, total length 1,000 to 1,100 mm, head to body 250 mm, tail 750-850 mm. Tail is thin in front but broad 200-250 mm at 4-11 cm; weight about 100 g. The body is large, narrow, and flattened. The dorsal greenish olive is separated from a lighter yellowish and blackish green by a narrow line. A broad, dark brown band extends up the sides of the body. The blackish dorsal blotches are brownish green with narrow black borders. Some specimens are entirely black. A yellowish brown line runs along the midline of the head and extends down the back. The head is broad, with prominent nostrils and large eyes. The gape is 25 mm in length and has large fangs. There are average 100 scales on the dorsal surface, 100 on the head, and 100 on the tail. The scales are small, with a diameter of 1 mm. The head is 25 mm in length and 10 mm in width. The body is 250 mm in length and 100 mm in width. The tail is 750-850 mm in length and 20-25 mm in width. The head is 250 mm in length and 100 mm in width. The body is 250 mm in length and 100 mm in width. The tail is 750-850 mm in length and 20-25 mm in width.

Conceptualization of Learning as a More Integrated Process of the entire group and system as a whole is needed and the learning opportunities ought to reflect a group as well as individual. As a result, we should re-examine the learning model opportunities.

Adult males: greatest length: 300 mm; head length: 40 mm; body length: 200 mm; snout length: 30 mm; caudal peduncle length: 40 mm; caudal peduncle depth: 14 mm; average mass: 40 g. W. Hoffa Park A. brown. Presumably a native species, but its extent and abundance in the northern part of the province.

♂ 2.5 cm. long in a. Anterior Tarsal length 1.84 mm. in. 4.58 height at shoulder 284 weight 83 pounds (at 4-1/2 year age) suggested by Anderson skull greatest width 290 2 posterior breadth 147 coverage 3 Alaska (from specimens Anderson apparently similar to *crassirostris* in shape but with slightly larger skull and differing in other cranial characters) Far eastern eastern part of the province

13) *Canis lupus occidentalis* Goldman. Total length 1870 mm, tail 410, and foot 240 (type Goldman) skull, greatest length 242.2, zygomatic breadth 128.0 (Watson Lake male, Anderson). A light colored subspecies differing from the preceding races in its smaller size of the skull and in skull details. (The southern plains are now largely exterminated.)

14) *Canis lupus canadensis* Goldman. Total length 1600 mm, tail 370 (female Goldman) skull, greatest length 282, zygomatic breadth 152 (Jasper Park male, Anderson).

*Lynx baileyi occidentalis* is large size but less and bushy grey, or whitish apparently differs from the above three races in average darker coloration (from *irremotus* in larger size and in skull details, the Rocky Mountains about Jasper and northward).



Figure 81. Wolf

**Distribution in Alberta.** Formerly generally distributed but now practically exterminated in the southern, more settled areas. Still common in the north and in the mountains from Jasper north.

*Life History* Five to 14 young (average about 7) born after a gestation period of 60 to 63 days, young usually cared for by both parents, in an excavated den but sometimes in a surface bed in dense forest. Food: moose, bison, sheep, caribou, rabbits, and almost any other mammal or bird of the region. Kib's stock, also eats carrion and garbage.

*General.* The howl of the timber wolf and the call of the lone are two sounds that truly belong to the remote wilderness, a sure indication that one has passed beyond the area where man is in control.



Figure 62. Diagram of hind feet of wolf (left) and cougar (from skins) showing differences observable in tracks.

The wolf is usually considered a villain, the bear a clown, despite the fact that bears do real and assessable damage. The prejudices are probably from the time when we heard stories such as that of Goldrocks and the three bears, when the bears were likable characters, and such old world stories as children being thrown from wolf pursued sleighs to delay the wolf pack while it devours this offering, and allows the sleigh and driver to escape.

The wolf is a predator fitted to kill big game. Thus it does. In the stock-raising country where the wolf came

into contact with cattle, the wolf had to disappear and this happened in southern Alberta in the early part of the century.

But in the wilderness it is a different question. Should we eliminate the wolf if we could? There are areas where predation has been eliminated and big game has increased so that it ate the available food and starved or had to be slaughtered. There is the classical argument that wolves by preying on the weak and unfit benefit the species concerned.

The wolf is often blamed for many things it does not do. It is sometimes blamed for the decrease of game in areas in which game has been shot out. It is sometimes blamed for the general decrease of fur, a decrease obviously due to something else.

In summer single wolves or small bands of them may be seen but in autumn and winter larger bands up to 20 or 25 are not uncommon. These packs are probably composed of two or more families.

The question of the wolf as a predator has recently received much attention and Murie has made an excellent study of this in Alaska. Most of the reader is referred Predator-prey relationships is a complex one. The predator may fluctuate greatly in numbers irrespective of its prey. Normally the prey species are able to withstand predation and when the predator becomes too abundant and its prey scarce the predator also sooner or later becomes scarce. Then the prey species increase, perhaps until their food supply becomes depleted and a period of scarcity is indicated for them. Thus there is no balance but a huge pendulum swing.

Management is directed towards changing this swing to an artificial "Balance of Nature" and where there is much human hunting some control of wolf numbers may be necessary.

In the early 1930's Seeger estimated the wolf population in Wood Buffalo Park at about 24 wolves to 200 square miles, or one wolf to about 8.3 square miles.

In Alberta wolf bounties were paid before 1931, and since 1936, the bounty varying from \$2 to \$10. The follow-

ing from provincial reports is the number of wolves on which bounties have been paid in certain years.

Year	No. of wolves
1936	187
1937	287
1938	361 (including 12 pups)
1939	729 (including 38 pups)
1940	632 (including 67 pups)
1942	773 (including 57 pups)
1943	536 (including 54 pups)
1944	645

That this apparently had no effect in controlling their numbers is shown by the increase in wolf pelts marketed during this period, as listed below.

The wolf is difficult to catch. It is a large awkward animal to pelt on the trap-line; its capture demands much labour, the pelt is bulky to handle and the price is relatively low. Hence, though common in the north it is not important as a fur animal.

The annual total values of the wolf taken from Alberta in the period 1919-20 to 1943-44 has varied between \$700 and \$29,606; the average value per pelt has varied annually from \$4 (1934-35) to \$25.20 (1936-37).

The Alberta wolf yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	126	1932-33	100
1920-21	371	1933-34	135
1921-22		1934-35	192
1922-23	2,129	1935-36	351
1923-24	184	1936-37	435
1924-25	263	1937-38	432
1925-26	167	1938-39	382
1926-27	115	1939-40	309
1927-28	190	1940-41	452
1928-29	186	1941-42	503
1929-30	165	1942-43	477
1930-31	205	1943-44	732
1931-32	130		

#### References

- Criddle, 1925. Dominion of Canada. Dept. Agriculture, Bull. 13. N.S. (economic importance and control methods)  
 Murie, 1944. The Wolves of Mount McKinley (excellent life history and predation discussion)



- Soper, 1942 *Jour. Mammal.*, 23, pp. 131, 132 (Wood Buffalo Park, outside beds for voreag)  
 Young and Goldman, 1944 *The Wolves of North America* (general and taxonomic review)

#### FAMILY FELIDAE. CATS AND THEIR RELATIVES

The cats are the most specialized of the carnivores in structure and habits. It is a widespread group, living only in Madagascar and the Australian area, and is especially rich in species in the tropics where such representatives as the lion, tiger, panther, and jaguar occur.

Cats in general are lithe and by strength. They are largely nocturnal though also about by day, and many, with fully retractile claws climb well. Many species have a distinctly patterned coat and, in some, as the cougar where the adult lacks this, the young may differ from the adult and be patterned.

Three species of this family occur in Alberta. The young are born in a helpless condition, and are cared for in a nest by one or perhaps by both parents during infancy. Their food is largely fresh meat, which they catch themselves.

Two of our species, the bob cat and the cougar are American, one, the lynx has a very close relative in the boreal part of the old world.

#### KEY TO ALBERTA SPECIES

- (1) Tail more than half as long as body—cougar (*Felis concolor*)  
 (1a) Tail less than half as long as body 2  
 (2) Tail with tip black above and subterminal bars—bob cat (*Lynx rufus*)  
 (2a) Tail with tip black all around and no subterminal bars—lynx (*Lynx canadensis*)

#### Cougar. *Felis concolor* Kerr

(Also called Mountain Lion or Puma)

**Diagnosis.** Total length up to 112 inches (2844 mm.) skull greatest length 9½ inches, zygomatic breadth 6  $\frac{1}{4}$  inches. This, a male from Alberta, is the second largest trophy of this species listed in "North America Big Game" by Ely et al. in 1939. Weight up to about 200 pounds.

Colour, above tawny brown to grey, with black on the backs of the ears, on muzzle, and on tip of tail, eye stripe, legs, and underparts whitish.

The large size, tawny colour and long tail are distinctive.

*Geographical Variation* With a range from northern British Columbia to Patagonia, the cougar exhibits variation that permits the recognition of nineteen subspecies according to a recent review, only one occurs in Alberta—*Felis concolor nasoutensis* Goldman.

*Distribution in Alberta* Fairly common in the Rocky Mountains of the west, perhaps rarely wandering eastward onto the plains.

*Life History* One to 5 young born in the spring, after a gestation period of 90 to 92 days, in a rocky cavern or other shelter, food largely mammals, deer being an important item.

*General* The cougar is one of the shyest and least often seen mammals of the forest.

Though rarely seen, it has a curiosity about humans that leads it to trail persons long distances, as hunters have found when they have recrossed their tracks and seen the cougar's tracks along with their own. Cougars have been accused of unprovoked attacks on humans, and there seem to be authentic cases of this, but they are extremely rare.

The scream of the cougar, said to resemble the scream of a woman, is often spoken of but apparently rarely heard.

This big cat originally spread as far east as Ontario. With a taste for livestock, especially foals, its presence

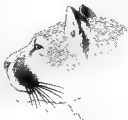


Figure 53. Cougar head.

was incompatible with settlement and it had to disappear over much of its range. We are fortunate in having areas in the Rocky Mountains where these animals can continue to survive.

Bounties have been in effect in Alberta, and the following data give the number of cougars on which bounties have been paid in some years:

Year	No of cougars	Bounties per animal \$
1944	22	15
1945	4	15
1946	28	20
1947	27	20
1948	60	20
1949	59	20
1950	56	
1951	56	10

*Lynx. Lynx canadensis* Kerr

**Diagnosis.** Total length 872 mm (34 2 in.), tail 93 mm (3 6 in.), hind foot 223 mm (8 7 in.) (an Alberta specimen, Preble), a short-tailed, long-legged cat with large feet, long ear tufts, and a pronounced ruff on sides of head and below chin, colour above generally a grey, grained blackish and buffy, below white, the underparts and flank and side of limbs obscurely marked with dusky, ear tufts black, tip of tail black all around, the ruff mixed with some black.

For comparison with bob cat See under that species.

**Geographical Variation.** With a wide range across the boreal part of North America (a closely allied species occurs in the northern forests of the Old World) it shows little variation, and the form that occurs in Canada is *Lynx canadensis canadensis* Kerr.

**Distribution in Alberta.** The coniferous forests of the north and the west.

**Life History.** Fluctuates greatly in numbers over about a 10-year cycle, 1 to 5 young born after a gestation period of probably about 63 days, food chiefly snowshoe rabbits.

The first of these is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided. The second is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided. The third is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided.



Figure 44. Syon.

The first of these is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided. The second is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided. The third is the fact that the majority of the people who are interested in the study of the history of the United States are not interested in the study of the history of the United States. This is a very common mistake, and it is one that should be avoided.

## The Alberta lynx yield is as follows

Year	No. of pelts	Year	No. of pelts
1919-20	1,943	1931-32	1,517
1921-22		1932-33	1,987
1923-24	2,037	1933-34 <sup>1</sup>	2,112
1925-26	5,798	1934-35 <sup>1</sup>	2,493
1927-28	7,274	1935-36	2,202 <sup>2</sup>
1928-29	7,086	1936-37	1,680
1929-30	7,662	1937-38	323
1930-31	3,400	1938-39	734
	2,351	1939-40	1,928
	1,667	1940-41	780
	1,109	1941-42	772
	1,527	1942-43	1,271
		1943-44 <sup>1</sup>	1,474

<sup>1</sup>The peak years 1923-24, 1933-34-35, and 1943-44 show the striking decrease in peak years.

## Reference

Fox and Nicholson. 1942 *Jour. Animal Ecology* 11 pp 215-242 (Fluctuations)

Bob Cat. *Lynx rufus* Schreber

(Also called Wild Cat, Lynx Cat)

**Diagnosis.** Total length 40½ inches (1,001.9 mm.); tail 5½ in. (146 mm.), hind foot 6½ in. (165 mm.), skull, greatest length, 118.8 mm. (4.6 in.), zygomatic breadth 82.8 mm. (3.2 in.) (average measurement, Rollings, Minnesota). Weight, average 23 pounds (10.39½ pounds) (Rollings). A short-tailed, rather long-legged cat with conspicuous ears, small eye tufts, and small ruff on chin, hind foot relatively small, colour above grizzled greyish or brownish, below white, with irregular conspicuous spottings on underparts and sides, and distinct black bar on inside of foreleg; ear tips black; black mixed in ruff, tail above like back, but with black tip and subterminal black bars, tail below, whitish to tip.

Though there are only two species of lynx or wildcats in western Canada, there are sometimes said to be three: the bob cat, the lynx cat, and the lynx. Rollings, who studied the question in Minnesota, writes that the bob cat is distinguished from the lynx by its hind foot being 7 inches or less (lynx over 9 inches), ear tufts rarely being

over 1 inch long longer in lynx by having black bar on inside of foreleg (absent in bobcat) by having pelage at all buffy and much spotted long and almost solid grey in lynx by the differences in tail coloration (see above) the bobcat is a somewhat smaller with less of a ruff on chin. There is much variation in colour and larger and better individuals tend to be grayer and less spotted and are called "vixen cats" by trappers who say it is a different species, and fur buyers sometimes quote a separate price for it.

**Geographical Variation.** With a widespread range in North America up to southern Canada, there is considerable variation in colour and structure of this species, making a considerable number of subspecies recognisable, several of which at one time were considered species. Only one subspecies is recorded for Alberta.

*Lynx rufus pallidus* Merriam. Rare occurs only in the extreme south.

**Life History.** Two to 4 young born in the spring after a gestation period of about probably 62 days (as in the European lynx) and raised for in a rocky cavern or other shelter local small mammals including rabbits porcupine musk shrews and occasionally deer.

**General.** The bobcat is a southern animal preferring brushland and semi-wooded country rather than the heavy northern forests where it is replaced by its northern relative the lynx.

The bobcat depends largely on its keen sight in securing food and wanders about or watches from some selected lookout until it sees its game. Then it stalks expertly until within range, and makes a sudden dash. If the capture is not made at once the chase is given up (Bellings).



Lynx



Bobcat

Figure 32 Tail of the Lynx and Tail of bobcat shown by difference in markings

The bob cat is so scarce in Alberta that the pelts listed for the period 1930-31 to 1941-42 total only 26, with six the highest number reported in any one year. The annual average value has varied from \$1 to \$4.

#### References

- <sup>1</sup> Jan 1923 *Jour. Mammals*, 2, pp. 34-46 (Food)  
 (Julius 1943 *Jour. Wildlife Manag.*, 9, pp. 121-145 (winter habits and food in Minnesota)  
 Sumner 1921 *California Fish and Game*, 17, pp. 251-254 (habits and trapping methods)

## ORDER -RODENTIA RODENTS OR GNAWING MAMMALS

This does not include the rabbits and their relatives, which are here considered to belong to a different order the Lagomorpha. The most obvious character separating the rabbits is that they have four upper incisors, a functionless pair just back of the two main ones, but there are other more important anatomical differences.

The rodents present a vast array of mammals. About 345 genera containing 6,400 forms are listed in a recent monograph prepared in the British Museum. This is probably more than a third of all existing mammals.

Their distribution is more widespread than that of any other group, they range into north polar regions, in Australia and have spread into some of the islands of the Pacific.

In size many of them are small, but a weight of about 60 pounds is commonly attained by our beaver, and in South America are other rodents as large or larger, such as the Cavybara that is said to be 4 to 5 feet long.

The variation in form and habits of the rodents is only exceeded by one other group of mammals, the marsupials. Some rodents are adapted for an arboreal life like our squirrels, some even with a gliding membrane to aid in jumping from tree to tree as "flying squirrels". Other rodents are adapted for an aquatic existence such as our muskrat and beaver, with very specialized habits, some

forms are as functional as modes of which our pocket gophers are examples, though many forms are wingless or hop on the surface of the ground, some are adapted for leaping such as our kangaroo rat and the various of *Vesperugo*. In furry a wing, or extreme is represented by the long at rest quills of the Great Wooded peewee and the shorter more effect a quill of the New Wooded quill, and the other extreme by an African bear wing mode: *Heteromorphus* that has a small wing as it is such that it appears naked.

In order to the quill comes together back of the prolegs so that the animal can use them for growing without having unwanted material enter the mouth. Some forms have been known to carry food. The food of this group is largely vegetable but meat and insects are relished by many and are probably important in the diet of some such as our grasshopper mouse.

In Canada there are various adaptations for winter, some species such as some meadow voles and chipmunks store food, some hibernate during the cold weather, some like the lemmings change their winter colour to white to match the snow. Some of our squirrels are diurnal but many are nocturnal.

Rodents besides supplying some valuable or beaver, muskrat, chinchilla, some human food (rabbits and marmots) and our domesticated guinea pigs, derived from the South American restless rat, used as a pet and a laboratory animal are extremely important as being the first stage in turning grass and flesh food by many of the carnivorous animals. Indeed much of the fur trade of Arctic Canada is based indirectly on lemmings and mice and in years when the lemmings and mice are scarce as happens regularly over a 4 year period the staple fur the Arctic fox, also becomes scarce.

### References

- Elmore, 1933 The Families and Genera of Living Rodents (a national survey of the groups)  
 Elton, 1942 Voles, Mice and Lemmings (their distribution and the effect)



## SYNOPSIS OF MAMMAL FAMILIES IN ALBERTA

(Based on species occurring in the province)

Family 1. Sciuridae (squirrels and their relatives) Size medium to small (length 200-600 mm) (7.8-31.4 in.), body slender to stout, tail is scutate, well haired, and in arboreal squirrels bushy and flattened; head rounded, no external cheek pouches, skull with post-orbital processes (as in other families) (p. 125)

Family 2. Ctenomyidae (pocket gophers) Size small (length 200-225 mm) (7.8-8.8 in.); body stout, legs short, claws on fore paws elongated for digging, large fur-lined cheek pouches opening outside the mouth (a character shared only with the Heteromyidae); tail scantily haired (p. 147)

Family 3. Heteromyidae (kangaroo rats and pocket mice) Size small (length 125-300 mm) (4.9-11.8 in.), tail about as long as head and body, fore legs not stout and without elongated claws for digging, a pair of fur-lined cheek pouches opening outside of mouth (a character shared only with the preceding family) (p. 150)

Family 4. Castoridae (beavers) Size large (about 1 m long) (39.3 in.); body robust, hind feet webbed, tail naked, scaly and flattened (unique in the order) (p. 152)

Family 5. Cricetidae (mice and rats) Size mostly small (one the muskrat up to 530 mm (20.8 in.) long), mouse- or rat-like in shape without external cheek pouches, cheek teeth with crowns of reentrant folds of enamel giving angular patterns or tuberculate, the tubercles arranged in two longitudinal rows (p. 155)

Family 6. Muridae (Old World rats and mice) Size small (length up to 400 mm) (15.7 in.), typical rat or mouse shape, cheek teeth with tubercles arranged in three longitudinal rows (p. 152)

Family 7. Zapusidae (jumping mice) Size small (length up to 250 mm) (9.8 in.), shape mouse-like, fore legs short, hind legs very long, tail longer than head and body, upper incisors narrow and grooved in front (p. 153)

**Family 5. Erethizontidae** - American porcupines.  
 See large I for the order. Length about 800 mm (31.4 in.)  
 body stout, pelage of upper parts largely of spines (p. 100)

#### FAMILY 6. SCIRIDAE - SQUIRRELS AND THEIR ALLIES

In addition to what are usually thought of as "true squirrels" of which our red squirrel is an example this family includes the marmots, chipmunks, ground squirrels (often called gophers in Alberta), prairie dogs, and flying squirrels.

This family has a widespread distribution being absent only from Australia, Madagascar, and southern South America. It is a large group and the most brilliantly coloured species are found in the tropics.

In Alberta twelve species are found. They range in size from the tiny chipmunks to the heavy marmot that is over 2 feet long, many of them dig burrows around which they live, and live in treeless country, some are arboreal forest animals, some hibernates, some store food, all but the flying squirrel are diurnal, their food is largely vegetable but many catch animal food such as insects as well. The young are born in an undeveloped condition in a nest in some burrow or other hollow where they pass their infancy.

The word "gopher" as used in Alberta is usually applied to four of the species of ground squirrels. The word is too deeply rooted in the vernacular to change and must be accepted but it must be kept in mind that even though ground squirrels have external cheek pouches and are called gophers they are not pocket gophers. Pocket gophers belong to another family, *Geomysidae*, of burrowing rodents that have external pouches opening in the cheeks and are fur lined.

Many of this family are of considerable importance to man, the red squirrel is a fur bearer of some importance, some of the ground squirrels are so abundant and so fond of grain that local control measures are necessary by agriculturists (though on open range they may be beneficial because of the insects they eat) and some of the ground squirrels are involved in the spread of disease such as bubonic plague and spotted fever and perhaps others.

## KEY TO ALBERTA SPECIES

- (1) With glistening membrane-flying squirrel (*Glaucomys sabrinus*)  
 (1a) With no glistening membrane 3  
 (2) Conspicuous stripes on back 3  
 (2a) No stripes on back 4  
 (3) With five dark and four light stripes on dorsal surface—chipmunk—*Eutamias amoenus*, *Eutamias eximius*, *Eutamias rufocaudatus*  
 For a discussion of the differences separating these three taxa, see later section on *Eutamias*  
 (3a) With four dark and two whitish stripes on dorsal surface—striated ground squirrel (*Citellus tereticaudus*)  
 (3b) With thirteen to six or seven of dots on upper parts—thirteen lined ground squirrel (*Citellus richardsoni*)  
 (4) Nose large for the length—over 450 mm. (17.7 in.) 5  
 (4a) Nose smaller—less than 450 mm. (15.7 in.) long 6  
 (5) Green colour grey-white spot on top of nose—hoary marmot (*Marmota caligata*)  
 (5a) Green colour brown, no white spot on top of nose—woodchuck (*Marmota monax*)  
 (6) Generally pale yellow-brown—Richardson ground squirrel (*Citellus richardsoni*)  
 (6a) Not so 7  
 (7) Nose and underparts reddish brown—Columbian ground squirrel (*Citellus columbianus*)  
 (7a) Not so 8  
 (8) Upper parts generally reddish brown—red squirrels (*Tamiasciurus hudsonicus*)  
 (8a) Head grizzled grey, back olive-brown—Franklin ground squirrel (*Citellus franklini*)

Woodchuck. *Marmota monax* Linnaeus  
 (Also called Groundhog)

**Diagnosis.** Total length 482 mm. (18.9 in.), tail 117 mm. (4.6 in.), hind foot 70 mm. (2.7 in.). Wood Buffalo Park specimen; body stout, legs short, claws about somewhat longer on fore paws than on hind paws, tail short, cylindrical and somewhat bushy, fur rather long and coarse, colour head blackish on top, grizzled whitish on sides, upperparts reddish brown, guard hairs with black subterminal section and whitish tips, top of tail like back, underparts and legs rich reddish brown, feet blackish. Melanistic examples are rare in our area.

The large size and stout body separate the woodchuck from all its relatives but the marmot and the colour of the marmot, grizzled grey with a white patch on the nose, and still larger size, are sufficient to separate it from the woodchuck.

**Geographical Variation** This species ranges from the eastern United States and Nova Scotia to Yukon and a number of subspecies are recognised in Canada of which the following one is represented in Alberta *Marmota monax canadensis* Erxleben, to which the above diagnosis applies.

**Distribution in Alberta** The northern part of the province north at least to Entrance (Crow's) Red Deer River (Howell) and the vicinity of Lethbridge and Edmonton.

**Life History** Its life centres about its burrow dug by itself hibernates about 4 to 9 young born in spring after a gestation period of about 30 days, food largely succulent vegetation occasionally some bark of young trees.

**General** Rocky hill country sand ridges and well-drained valleys are favourite woodchuck country in the north, though it is also found in timbered alluvial flats (Soper). In settled country grassy fields and pastures are favoured.

With its burrows dug in the midst of its food supply the woodchuck's life is an easy one. It spends much of its time near the entrance of its burrow running itself or walking about with its lumbering gait poking up bits of succulent vegetation. Alarmed it gallops clumsily back to its burrow and if not too alarmed sits bolt upright to survey its surroundings and locate danger. Sometimes, in this pose it is so upright that it seems to lean over backwards. In the autumn it becomes very fat and although there is still plenty of food available goes into its long winter sleep.

Groundhog day is February 2. Current belief has it that if on this day the groundhog sees its shadow, there will be 6 weeks more of winter; if it does not see its shadow winter will be soon gone. It is obvious that this belief originated in a milder land. Seton says its origin is with

the negroes of eastern United States, but Bengtson indicates that it is imported from Europe where the same belief is held in regard to the Old World badger, another large burrowing animal.

#### References

- Bengtson, 1945. Fauna 7, pp 114-115 (superstition regarding weather forecasting)  
 Cross, 1943. Bull Amer Mus Nat Hist. 80, p 405 (occurrence, Entrance)  
 Hamilton, 1924. Ann Carnegie Museum 22, pp 33-173 (habits, New York)  
 Howell, 1913. No Amer Fauna, No 27 (habits and revision)  
 Steen, 1929. Lives of Game Animals (general)  
 Soper, 1947. Jour Mammal 22, p 122 (habitat, Wood Buffalo Park)

#### Heary Marmot. *Marmota caligata* Eschscholtz (Also called Whistler)

**Diagnosis.** Max. total length 747 mm (29.4 in.), tail 221 mm (8.7 in.), hind foot 105.6 mm (4.1 in.) (averages Howell for *M. c. arizonae*), body stout, legs short, claws stout, slightly longer on fore feet than on hind feet, tail short, cylindrical and bushy, fur rather long and coarse, colour above (tip of nose black, a patch from back of nose to between eyes white, top of head black, back of neck and fore back whitish grizzled with blackish, hind back and tail similar, but tinged fulvous, sides of head grizzled white and blackish, underparts and legs grizzled greyish, feet black).

The large size, greyish coloration and white spot on the nose are distinctive.

**Geographical Variation.** This western, mountain species, ranging from northern Alaska to Idaho, is divisible into about eight races of which the following two are represented in Alberta.

(1) *Marmota caligata arizonae* Hollister. Represented in Alberta only in the Jasper area.

(2) *Marmota caligata nevada* Howell. Similar in size and skull to *M. c. arizonae*, but very much whiter in coloration, range north to Banff (Crowe).

An additional form *M. c. skanawane* (King) nearly as dark as *caligata* but with a broader skull, has been reported from Jasper and Banff, but a survey of the material in the National Museum does not support this.

**Distribution in Alberta.** The east slopes of the Rocky Mountains from the edge of the plains to above timberline.

**Life History.** Hibernates, about 5 young born in spring; food probably grass and herbs.

**General.** "The big hoary marmots are well named 'Whistler' by all mountain climbing people of the Canadian Rockies. Crossing an alpine flat with its snow-banks, boulders, and quiet, one is often startled by a sharp, shrill whistle, which it is hard to believe does not signify menace to a human being. A search of the surrounding flat reveals, however, only a fat, vigilant marmot, perched on a huge rock and watching the intruder from a safe distance. The marmots are wary creatures, and at the first whistle of alarm all the animals inhabiting the flat seek a safe place near the burrow entrance ready to retire at a flash" (Hollister).

Though usually wary animals of timberline and above, Mr. deVos of Waterton Lakes found a group of them about the park headquarters cabin near Linnet Pond and there they stayed about the buildings and came within a few feet of the personnel. At Banff they came down into rock slides by the golf course.

#### References

- Anderson, 1934. *Can. Field-Nat.* 48, pp. 60-63 (distribution with map).  
 Crowe, 1943. *Bul. Amer. Mus. Nat. Hist.*, 80, p. 297 (taxonomic).  
 Hollister, 1912. *Can. Alpine Jour.* 4, pp. 28, 29.  
 Howell, 1918. *No. Amer. Fauna*, No. 37 (outline of habits, revision).

#### Mantled Ground Squirrel, *Citellus lateralis* Say

(Locally called Big Chipmunk)

**Diagnosis.** Total length 292.5 mm. (11.5 in.), tail 103.5 mm. (4.1 in.), hind foot 43.1 mm. (1.6 in.) (averages from Howell), front claws about twice as long as hind claws, colour upper parts back to shoulder rich

bright reddish brown, rest of back and rump graded greyish brown sides of back with a black longitudinal stripe, with a whitish yellow stripe below it, and a black one again below the whitish underparts and sides up to the black stripe buffy except for throat and chin that are tinged reddish brown hind feet buffy, fore feet tinged brownish, tail above graded black with a yellow fringe below rich red brown with a black submarginal band and a yellowish fringe.

The bright red brown fore part of the body and the one broad lateral whitish one bordered with a black line on each side are distinctive. Chipmunks have an additional dorsal black stripe narrower and have longer tails. In the law, the difference in claws is distinctive. The fore claws of the mantled ground squirrel are twice as long as those on the hind foot whereas the fore and hind claws of the chipmunk are about equal in length.

*Geographical Variation.* This is a variable group of western ground squirrels that ranges from central British Columbia and Alberta south to Mexico and is broken up into sixteen closely related subspecies and species (Howell) of which only one is represented in Alberta. *Citellus lateralis tesquorum* Hollister to which the above measurements and description apply.

*Distribution in Alberta.* The Rocky Mountains of the west.

*Life History.* More of a rock squirrel than restricted to burrows than its relatives. Hibernates, young 4 to 8 in number food chiefly vegetable including a wide variety of seeds and berries mushrooms frequently eaten, as are various insects (Howell).

*General.* Sitting quietly on a rock slide above timberline in the morning sun this ground squirrel's reddish brown hood shows out as one of the most brilliant colours worn by any of our mammals.

The mantled ground squirrels inhabit mountain slopes and foothills living in the more open forested country among rocks and fallen timber. Their burrows are dug usually under rocks or stumps and the animals spend much time resting quietly on some rock or log in the sunshine.

They occasionally climb into bushes and trees to a height of 20 or 30 feet in search of food, but their ordinary habitat is on the ground' (Howell)

Of their economic importance Howell says that living in the mountains they rarely come into contact with civilization but locally may do some damage to wheat, oats, or barley and about camps they may make a nuisance of themselves by raiding food stores. They may also damage gardens locally

#### Reference

Howell, 1938 No. Amer Fauna No 56 (habits, revision, bibliography).

#### Columbian Ground Squirrel. *Citellus columbianus* Ord (Also called Red or Mountain Gopher)

**Diagnosis.** Total length 358 mm. (13 in.), tail 92 mm. (3.6 in.), and foot 47 mm. (1.8 in.) (Alberca specimen), ears small, tail short, front claws about twice as long as back claws. Colour, above top of nose back to between eyes rather bright reddish brown, rest of upperparts greyish brown grizzled with black giving a coarsely barred effect, somewhat greyer on thighs, legs and feet reddish brown, underparts somewhat paler reddish brown; tail, above grizzled brown and black with a submarginal band and a whitish fringe, below rather reddish brown with black submarginal band and white fringe



Figure 67 Skull of Columbian ground squirrel

The bright reddish brown nose and face, and the reddish brown underparts are diagnostic

**Geographical Variation.** Over its range from near Peace River south into Idaho and Oregon this species has



three recognizable sub-species. Alberta specimens are referable to *T. f. columbianus columbianus* Ord.

**Distribution in Alberta.** The Rocky Mountains and their foothills of the west into the edge of the plains in the southwest.

**Life History.** Digs burrows for shelter and sleeping, hibernates for 7 or 8 months (longer at high altitudes<sup>2</sup>); young 2 to 5 (rarely 7); average 3.54 gestation period 34 days; food chiefly vegetable (grass, herbs, fruits, seeds) and some animal matter (insects and occasionally fish) (Howell).

**General.** The Columbian ground squirrel is a very common animal in the meadows above timberline in the valleys where there is grassland throughout the mountain slopes and in the south at least to the grassland on the edge of the plains.

When captured in summer in a grassy valley in the mountains the whistled alarm notes of these ground squirrels are one of the commonest sounds. It should be a call of alarm, but one I have seen be sitting head upright on the ground at the entrance to its burrow clapping its tail with its twitching tail and a half wave or more of its left ear may be feeding unconsciously with its a few yards away no attention to the call. Sometimes they are seen a nuisance by entering tents and eating foodstuffs. Though in parts of their range to the south it is a species may be an agriculture pest and Shaw has shown that in a season single animals kept in confinement under natural conditions destroyed on an average 300 pounds of winter wheat (quoted by Howell) in Alberta their range for the most part does not include agriculture land. However, another aspect of its relationship to man is that in the United States it is involved in the spread of spotted fever and bubonic plague (Howell).

#### References

- Crowe 1942 Bull Amer Mus Nat Hist, 69, pp 287-300 (unusual)  
 Howell 1936 N. Amer Fauna, No. 36 (contains life history, revision)  
 Shaw, 1938-1939 (contains important papers listed by Howell p. 226)

**Franklin Ground Squirrel.** *Citellus franklini* Sabine  
(Also called Grey Gopher and Bush Gopher)

**Diagnosis:** Total length 385 mm. (15 1/2 in.) tail 130 mm. (5 1/4 in.) hind foot 54 mm. (2 1/4 in.) (Alberta specimen) claws on front feet about twice as long as those on hind feet, colour top of head and neck black and grey grizzled, contrasting with rest of upperparts which are rather rich olive brown with rather conspicuous irregular barring, underparts and feet grey, (a. above grizzled grey and black, with a black submarginal band and a white fringe below greyish white with a partial submarginal black band)

The grey top of head contrasting with the olive brown back and the rather coarse barring is distinctive.

**Geographical Variation.** Though ranging from Illinois and western Ontario west to central Alberta, no significant variation occurs.

**Distribution in Alberta.** A restricted area in the park-lands of central Alberta west to Edmonton and south to Athabasca Landing.

**Life History.** Digs burrows. 1 littered young, 5 to 10 in number born in burrow in spring, voice a musical whistle. Food about two-thirds vegetable (includes cover timothy pine grass plants, mustard, probably other wild plants, various crops, seeds, and berries), animal food includes insects, mice, young rabbits and birds and their eggs (Howell).

**General.** The "grey gopher" seems to need shelter of some kind, tall grass or shrubbery. Apparently it is rare in Alberta east of Edmonton for Soper saw only one in the Islay area. It disappeared into a poplar "bluff" and intensive hunting over many promising localities yielded not even a glimpse of another.

However north of Edmonton Preble found it very common, frequenting brushy tracts and the borders of cultivated fields, and doing considerable damage to the sprouting grain.

Howell says of their economic status that in localities where they are common they do considerable damage to

grain crops and inside gardens. They have been known to take small chickens and hens eggs (Howell).

#### References

- Howell 1924. No Amer Fauna No 38 outline of habits, remarks.  
 Field 1908. No Amer Fauna No 27 occurrence north of Edmonton.  
 1909.  
 Soper, 1921. Can. Field-Nat., 35, pp. 196, 197.

#### Richardson Ground Squirrel. *Citellus richardsoni* Sabine

(Also called Flickertail Yellow Gopher Prairie Gopher.)

*Diagnosis:* Total length 285.4 mm. (11.2 in.) tail 73.8 mm. (2.9 in.) hind foot 44.9 mm. (1.7 in.) (averages from Howell). Ears very small, tail short, claws on fore feet about twice as long as those on hind feet. colour above general, y. pale grayish brown lightly grizzled with blackish on back with a slightly browner area on top of nose. underparts and feet chiefly whitish, tail above mixed brown and blackish with an indistinct submarginal line of black. Some animals are more yellowish than others.

The rather uniform pale colour of the upper parts of this species is distinctive.

*Geographical Variation.* This animal of the Canadian prairies and the western states to the south is divided into three subspecies (Howell) and is represented in Canada by a single subspecies *Citellus richardsoni richardsoni* Sabine (which the above diagnosis applies).

*Distribution in Alberta.* The plains and parklands of the south and central parts of the province north at least to Edmonton.

*Life History.* Makes dens into which it retires for shelter and sleep. hibernates. one litter a year of 8 to 11 young (average 7.5) born in the underground burrow after a gestation period of 28 to 32 days. voice a short shrill whistle. food native grasses and flowering plants seeds of various plants, and grain. Early in the season they cut off and eat the succulent stems of the grain, and when it is ripening they pull down the stalks and cut off the heads (Howell).

*General.* The plains country is the home of the flickertail, and it becomes extremely common. On the open prairie ridges between Medicine Hat and Brooks the animals at the entrance of the burrows and their connecting trails are so numerous that they form a conspicuous white pattern on the brown prairie.

The mound of earth at the main entrance of the burrow. In sandy soil, a circular passage of the animals may have worn the entrance large up to 6 inches or more in diameter. But it is 20 feet away there may be other entrances perhaps a group of six or eight of these each just big enough for a square and without any mound of earth. These are probably later entrances dug up from the underground nest and this would account for the lack of excavated earth about them.

Though no common ~~animal~~ there are areas where one would expect these animals and there are none. Perhaps it is because they are common. But in a waste area between Medicine Hat and Wainwright the local people say there used to be plenty of these animals about 25 years ago and there are owl burrows in evidence but there are no flickertails there now. Rattlesnakes are common and it is held locally that their recent increase caused the disappearance of the ground squirrel in this area.

These ground squirrels are particular about just when they are abroad. They sleep all winter. Animals have been reported active in early April (Howe) and as early as early November (Seager). But also in the summer they seem to take a quiet period during the middle of bright days and on rainy days they spend very little time out of their burrows.

Sometimes when a traveller is ranging on the plains sitting quietly one of these animals will come into camp even under a person's chair with little or no alarm. At such times the gait is a walk, it seems as though the belly drags on the ground as the ground squirrel goes slowly about gathering prairie grass and storing it in its cheek pouches, apparently to eat at leisure back in its burrow.

They get their name flickertail from their habit of rapidly twitching up their tail when excited or alarmed often accompanying this with a chirping or whistled call.

The gallop of the flickertail, as it heads back for its burrow, has a peculiarity. Every now and then the animal throws the fore parts of its body upwards, disturbing the rhythm of its gallop. It looks as though it were a mistaken effort to gain greater speed. It seems difficult to understand until you see the flickertail galloping through a patch of low dense grass. In places the grass seems too dense for the animal to force a way through, and then comes the little upward throw of the body, which lifts the shoulders above the level of the dense obstruction and allows it to scamper ■■■

The abundance of these animals and their fondness for grain makes it the most destructive of the ground squirrels. Local control is necessary by wheat growers. It is usually carried on by mixing a commercial "gopher" poison with oats or mixed grain and putting a spoonful down each burrow where it is inaccessible to other animals.

This is one of the animals involved in the spread of bubonic plague and perhaps other diseases.

#### Reference

Howe I, 1936. No. Amer. Fauna, No. 56 (outline of habits, revised long bibliography)

**Thirteen-lined Ground Squirrel.** *Citellus tridecemlineatus* Michx II

(Also called the Striped Gopher, Thirteen-Striped  
Spermophile)

**Diagnosis.** Total length 244.2-284.9 mm. (9.5-11 in.), tail 80.7-104.7 mm. 3.1-4.1 in.; hind foot 33.9-39.8 mm. (1.2-1.5 in.); front claws about twice as long as hind claws. Colour above rather rich brownish black, with about thirteen longitudinal stripes and interrupted rows of dots running from shoulders to rump, below buffy, feet buffy, tail above grizzled brown, with a submarginal band of black and a white edge, below red-brown toward base, paling terminally, with the black submarginal band and buffy fringe.

The pattern of the thirteen stripes is distinctive.

**Geographical Variation.** This species, with a range from Alberta to Ohio and south to Texas varies consider-

ably and eight or more races are recognizable. The Alberta populations are separable into two subspecies, a large, dark northern form and a small, pale, southern form.

1) *Citellus tridecemlineatus tridecemlineatus* Mitchell. Total length 284.9 mm., tail 104.7 mm., hind foot 39.8 mm. (averages from Howell), in the northern part of its Alberta range.

(2) *Citellus tridecemlineatus pallidus* Allen. Total length 244.2 mm., tail 80.7 mm., hind foot 32.9 mm. (averages from Howell), distinctly smaller and paler than the nominate race (Howell), extreme southern Alberta and southward (Anderson).

*Distribution in Alberta.* The southern and central parts of the province, north to Athabaska Landing and west to the edge of the mountains at Watrous Lake.

*Life History.* Makes burrows, hibernates, young 5 to 13, gestation period 27 to 28 days, stores food, food a variety of small wild plants and seeds in addition to cultivated grains. are especially fond of grasshoppers and other insects (Howell and Wade).



† FIG. 66. Feet of thirteen-lined ground squirrel showing wing-digging claws especially on fore feet.

*General.* The "striped gopher" occurs in places along with the Richardson ground squirrel but ranges farther north and seems to be much more localized. In places it seems to be more of a bushland animal. Preble writes that it was abundant along the road between Edmonton and Athabaska Landing, usually frequenting open uncultivated fields, but also seen running across the road in the poplar covered tracts. However, Rand found very few of these animals in extensive travel over the southern plains in 1945.

These ground squirrels destroy some grain and garden produce, but against these destructive tendencies must be placed their usefulness for grasshoppers, cutworms, web-worms and other injurious insects. Wherever the squirrels occur in extensive grasslands they are distinctly beneficial (Howell).

#### References

- Howell 1928 No. Amer. Fauna No. 38 (habits, etc.)  
 Preble 1908 No. Amer. Fauna, No. 27  
 Wade 1927 Jour. Mammals 3 pp 289-294 (breeding habits)  
 Wade 1930 Jour. Mammals 11 166-188 (behavior + hibernating)

(Black-tailed Prairie Dog, *Cynomys ludovicianus ludovicianus* Ord)

The black-tailed prairie dog has been found in Canada only in southwestern Saskatchewan but it is possible that it may be found in Alberta. It is colonial in habit and the groups of its burrow-chunging pairs are called prairie dog towns or dog towns. The prairie dog is a medium-sized rodent, total length 390 mm (15.3 in.), tail 80 mm (3.1 in.), hind foot 65 mm (2.5 in.) with a stout body, very short ears and short tail. The claws of both fore and hind feet are rudimentary and adapted for digging. In colour it is rather uniform, pale pinkish brown above with a conspicuous black tip to the end of its tail. The underparts are yellowish white. For details of distribution See Soper 1944. Further Data on the Black-tailed Prairie Dog in Western Canada. Jour. Mammals 25 pp 47-48.

#### Least Chipmunk, *Eutamias minimus* Bachman

*Dipodomys*. Total length 197-217 mm (7.7-8.5 in.), tail 85-101 mm (3.4-3.9 in.), hind foot 31-33 mm (1.2 in.), skull greatest length 32-33, zygomatic breadth 18-19. Ears moderate, tail rather long and only slightly bushy, short curved climbing claws on all four feet, colour top of head grizzled brown and grey, a blackish line through eye, a whitish one above and behind eye and then a dark line back with five blackish longitudinal stripes separated by four greyish ones, shoulders and flanks more or less strongly washed with reddish brown, rump grizzled brown.

and grey underparts white tail, above grizzled brown, black and buffy fringed with buffy, below buffy brown with a submarginal band of black.

This species is very similar to the two following species, which see for comparisons.

*Geographical Variation* With a western distribution in the United States and in Canada east to Ontario, the species has more than a dozen recognized subspecies, of which five are represented in Canada and the following two forms occur in Alberta.

(1) *Eutamias amoenus borealis* Allen. Total length 217.4 mm, tail 101.7, hind foot 31.3 mm, skull, greatest length 33 mm, zygomatic breadth 18.3 (Howell); a rusty, red-brown form occurring generally except in the extreme south-west.

(2) *Eutamias amoenus oregonus* Merriam. Total length 187.2 mm, tail 86, hind foot 31.8, skull, greatest length 32.3 mm, zygomatic breadth 18.4 (Howell); a paler form with yellowish rather than rusty colour predominating and with a shorter tail. Recorded from Waterton Park at higher altitudes and Mount Forget-me-not.

*Distribution in Alberta* General in the north; local in the south where brushlands occur on the plains; occurs at lower altitudes in the Jasper Park area and at high altitudes in Waterton. The distribution and ecological relationships of the chipmunks of the *Reclus* would repay study.

*Life History* Digs and utilizes burrows, stores food, becomes inactive and probably hibernates in winter, young 4 to 6 in number, food largely vegetable, seeds and fruits (Howell); many insects eaten in the early autumn (Aldous).

*General* These little chipmunks, of the brushland and open forests and forest edges, are among the most attractive of our mammals. Though usually terrestrial they sometimes climb. Sometimes tracing what seems to be the low, short call of a bird repeated many times, one may find it given by one of these chipmunks, perched on a low



branch. When the animals are at rest the long tail is often switched from side to side but when running it is elevated at a sharp angle.

They commonly climb into berry bushes for the berries and seem to do this for the seed in them, cutting open the berries, stuffing the seeds in<sup>1</sup> their cheek pouches, and dropping the pulp.

They are usually shy and react to loud away to shelter at any squirrel. Above timberline they go scampering away far ahead over the slopes. However they become very tame about camps and settler's nests where they are fed.

### References

Allen, 1901. *Ann. Museum.* 22, p. 16-20 (Woodrats).  
Huxley 1929. *N. Amer. Fauna* No. 22 (Chipmunk).

### Allen Chipmunk. *Eutamias amoenus* Allen

**Dimensions of Alberta forms:** Total length 217-222 mm (8.5-8.7 in.); tail 96-102 mm (3.7-4 in.); hind foot 33-34 mm (1.2 in.); skull greatest length 33-34, zygomatic breadth 19, shape and colour very like that of the little chipmunk. *E. minimus*. Colour: top of head grizzled brown and grey, a blackish line through eye, a whitish line above and below eye, brown dark line back with five long dorsal blackish stripes separated by four whitish stripes, shoulders and flanks washed with rusty red, rump grizzled greyish brown, underparts of body whitish (ochraceous) or buffy intermediate at tail above black and clay coloured, below clay coloured with a submarginal black fringe.

Compared with the little chipmunk to which it is similar, the buffy belly of the western form *infuscatus* is distinctive. The northern form *fulvifrons* has white underparts not compared with the little chipmunk *E. minimus borealis* as it does. Tail length are of the same but tail averaging eighty shorter and hind foot considerably larger, skull slightly larger and relatively broader across zygoma, the rostrum longer and narrower, sides of body hind feet and under surface of tail darker, light dorsal stripes clearer white (less mixed with cinnamon), rump and thighs more greyish (less ochraceous). (Howell.)

The next species *E. rufescens* the rufous tailed chipmunk is a larger more richly coloured white-bellied animal.

*Geographical Variation.* This is a species of the western United States and Canada in which about ten races are recognized of which two occur in Alberta as follows:

(1) *Eutamias amoenus latrans* Allen. Total length 221.5 mm. tail 101.8 hind foot 31.2 skull greatest length 34.2 rostrum breadth 19 (averages from Howell). This form has a buff-colored belly recorded from Banff to Waterton.

(2) *Eutamias amoenus latrans* Holister. Total length 217 mm. tail 96.4 hind foot 33.5 skull greatest length 33.8 rostrum breadth 19 (averages). It is similar in color to *latrans* but head and ears slightly more grayish, less numerous underparts more white (rather than buff) and tail averaging rather tawny beneath (Howell) in the Jasper area in the mountains.

*Life History.* Presumably like that of the little chipmunk *E. minimus* makes burrows at its food becomes inactive or hibernates 4 to 6 young born local chiefly seeds and fruits.

*General.* Where horses have been fed and ate spilled feed chipmunks gather to profit by the waste. They stuff their cheek pouches full of the grain then carry it to their underground caches to store it for future use.

Burned over areas with a criss-crossing of fallen dead timber forming a network of highways for these animals seems to be a favorite habitat. Here the berry bushes and grass grow to yield their seeds and scattered rocks and hollow logs provide refuges.

Though similar in habits and appearance to the little chipmunk there are striking peculiarities about the ranges of the two species in the Jasper and Waterton Lakes area. In the Jasper area the little chipmunk occurs in the mountains being replaced in the mountains by the Allen chipmunk that is most common at lower altitudes but occurs in timberline (Holister). In the Waterton Lakes area conditions are reversed the little chipmunk is a timberline species and the Allen chipmunk occurs below it at lower

altitudes about Banff both species occur together at altitudes of 6,500 to 7,000 feet but the present species is common lower.

#### References

- Howell - 1912 Can. Nature Jour. 4 special number pp. 30, 31 (distribution habits)  
Howell 1929 No Amer. Fauna No. 32 (revision)

#### **Rufous-tailed Chipmunk.** *Eutamias rufocaudatus* Howell

**Diagnosis.** Total length 231.2 mm. (9 in.); tail 106.2 mm. (4 1/4 in.); hind foot 75 mm. (3 in.); averages, Howell. Color: top of head brown grizzled with grey; a dark line through eye and a light then a dark line both above and below; two blackish longitudinal stripes separated by four whitish stripes on back; shoulders rather bright rufous; sides greyish brown washed with rufous; rump dark brown and grey; grizzled; under side of body white; tail above mixed black and tawny with a tawny fringe below; rufous with submarginal black band.

Distinguished from the other chipmunks by its larger size and more rufous shoulders and tail often evident in life; also its larger skull with more slender rostrum.

**Geographical Variation.** A species of the mountains of the northwestern United States and western Canada, two subspecies have been recognized of which one is represented in Alberta and to which the above diagnosis applies. *Eutamias rufocaudatus rufocaudatus* Howell.

**Distribution in Alberta.** The eastern slopes of the Rocky Mountains, common at moderate elevations in the Waterton area.

**Life History.** Probably like that of the two preceding species; digs burrows, hibernates 4 to 6 young; food seeds and fruits.

**General.** When the morning sun comes peering into the clearings on the heavily forested mountain slopes, these chipmunks come out out logs or fallen tree tops to enjoy the sun's warmth. They have a scolding note like that of their near relatives, sometimes running so closely together that the result is almost a trill.

A group of species such as the three chipmunks, the little, Allen and rufous-tailed, is always intriguing to a naturalist. They look so much alike that for many years experts did not have their names straightened out. They are difficult to tell apart in the field yet presumably they recognize each other unerringly. That their habitat requirements are different is suggested by their distribution on the mountain slopes above Waterton Lakes, where Allen chipmunks live commonly at low altitudes, rufous-tailed at intermediate altitudes and the little chipmunk scampers about over the talus at timberline. Some day an energetic student will make a comparative study of these animals that will add to our knowledge of how species come into existence.

#### References

- Anderson and Rand, 1943. Can. Field-Nat., 47, p. 135 (distribution).  
 Howell, 1929. No. Amer. Fauna, No. 32 (revision).

#### Red Squirrel. *Tamiasciurus hudsonicus* Erskine.

**Diagnosis.** Total length 321.7-331.8 mm. (12.6-13 in.) tail 127.3-137.8 mm. (5.0-5.4 in.) hind foot 43.3-50.5 mm. (1.6-1.9 in.) a bushy tailed tree squirrel with short curved claws for climbing. colour above reddish brown, tail the same with a submarginal band of black, underparts white in summer with a black line along flanks at the edge of the red-brown, brighter coloured in winter, with longer fur on the ears, and lacking the black line on the flanks.

**Geographical Variation.** The red squirrel has a continent wide distribution in the coniferous forests and is broken up into a number of subspecies of which three have representatives in Alberta as follows:

(1) *Tamiasciurus hudsonicus probens* Howell. Total length 331.8 mm., tail 137.8, hind foot 50.5 (averages, Howell) a bright coloured form, the northern part of the province.

(2) *Tamiasciurus hudsonicus columbianus* Howell. Total length 321.7 mm., tail 127.3, hind foot 43.3 (averages, Howell), like the above, but tail averages shorter,

upperparts in winter darker more olivaceous, and less suffused with buff, feet tawny rather than grey, tail darker, with darker edgings, skull averages smaller; the Rocky Mountains from Banff northward.

(3) *Tamiasciurus hudsonicus richardsoni* Bachman. Total length 323 mm., tail 120, hind foot 49 (Waterton Lake specimen), a much darker form, in the extreme southwest, intergrading with *columbianus* over a wide area (Crowe).

**Distribution in Alberta** The coniferous forests of the north and of the mountains in the west.

**Life History** Arboreal and terrestrial, does not hibernate, but becomes inactive for days at a time in bad weather sleeps in burrows and in stick nests in trees, young usually about 6, born in the spring after a gestation period of about 6 weeks (Hall), seeds of conifers are an important food, but eats many other seeds, buds mushrooms, berries and sometimes takes nesting birds and insects, in winter comes to meat bait readily.



Figure 86 Feet of red squirrel, showing short, curved, climbing claws

**General** The red squirrel is the favourite of the forest to many people. It is the mammal most likely to be seen in the seemingly endless stretches of conifers. When the squirrel learns of the presence of an intruder, he probably does not freeze to escape observation, or flee to remove himself from danger but approaches to investigate, and usually it seems that he is not pleased with what he finds, if one can judge by the vehement chattering and scolding he indulges in as he darts about on a low branch, or hangs head downward from some tree trunk. But he is never still for long. His amazing energy is well illustrated

by the following note from a mountain climber: "Approaching timberline I had just climbed a steep slope slippery from pine needles, perhaps 300 feet high, and thrown myself down to rest under the shade of one of the few scattered pines to regain my breath. Looking down I saw a squirrel come bounding up the steep slope I'd just tumbled up. Without a pause he surmounted the slope then ran to the top of a pine tree, decided it was the wrong one, ran down again and up the next one to sit on a topmost branch and give his cheery trill while I wondered whence came all his energy, and wind."

In the early days of the fur trade red squirrels were considered worthless but in recent years they have assumed an important place in the fur trade.

The annual total value of the squirrel taken from Alberta in the period 1930-31 to 1943-44 has varied between \$22,143 and \$1,589,738, the average value per pel has varied annually from 7 cents (1932-33) to 60 cents (1943-44):

The Alberta squirrel yield is as follows:

Year	No. of pelts		Year	No. of pelts
1930-31	247,991		1937-38	1,034,886
1931-32	268,494		1938-39	1,709,182
1932-33	310,333		1939-40	3,025,901
1933-34	1,366,326		1940-41	1,534,804
1934-35	1,179,155		1941-42	4,907,933
1935-36	473,898		1942-43	1,168,367
1936-37	1,309,239		1943-44	689,039

#### References

- Crowe 1942. *Bull. Amer. Mus. Nat. Hist.*, 80, p. 460 (taxonomy).  
 Hall 1929. New York State College Forestry, Syracuse. Roosevelt Wildlife Annual, Bul., vol. 2, No. 1 (the history and habits).

#### Flying Squirrel. *Glaucomys sabrinus* Shaw

**Diagnosis.** Total length 315-322 mm. (12 4-12 6 in.), tail 140-149 mm. (5 5-5 8 in.) Hind foot 39 5-41 7 mm. (1 5-1 6 in.) Gliding membranes extend from wrist to ankle, tail wide and very flat, eyes large, fur long, fine, and soft colour, above greyish or cinnamon brown with slaty colour of under fur showing through when fur is disarranged below whitish tinged yellowish or cinnamon

The flat wide tail and the gliding membranes set this off from any other of our squirrels.

*Geographical Variation.* This species with a trans-continental range in the coniferous forests is divisible into a number of races of which the following three are represented in Alberta.

(1) *Glaucomys arboreus arboreus* Shaw. Total length 315 mm. tail 140 mm. foot 40 (Howell) northern and central Alberta east of the mountains.

(2) *Glaucomys arboreus alpinus* Richardson. Total length 322 mm. tail 149 mm. foot 41.7 (averages Howell). like *arboreus* but upperparts more grey or less vinaceous; tail darker and skull larger with broader brain case (Howell) the northern part of the Rocky Mountains of the west south at least to the Jasper area.

(3) *Glaucomys arboreus leucus* Blouch. Total length 311 mm. tail 142 mm. foot 39.5 (averages Howell). similar in size and colour to *arboreus* but upperparts averaging more drab less vinaceous or ochraceous and underparts more washed with pinkish cinnamon (never yellowish white as in *arboreus*). foot longer. differs from *alpinus* in upperparts being noticeably more vinaceous. tail, feet and underparts washed with fuscous (Howell) the southern part of the Rocky Mountains of the west.

*Distribution in Alberta.* The coniferous forests of the northern and central parts of the province and the mountains of the west.

*Life History.* Nocturnal, largely arboreal, active throughout year, sleeps in hollow tree or stick nests (built by themselves). Young 3 to 6 in number gestation period probably about a month, store some food, feed largely seeds with a pronounced fondness for meat some insects eaten (Howell).

*General.* The flying squirrel differs from all our other squirrels in being arboreal only by night. It is the most arboreal of our squirrels and its gliding membranes allow it to make sailing jumps as long as 50 yards. The squirrel leaps from high up on one tree swoops down and sharply

upwards at the end of the glide to light on the trunk of another tree. It is able to guide its course in the air and to turn to the left or the right.

The men who trap for fur are the persons who know how common the flying squirrels are. Their appetite leads them into meat-baited snare and weasel traps, and the trapper resents their presence for to him they are worthless.

Even where common they are seldom seen by a person in the forest, perhaps one will come gliding down to land with a thump on the tent or one may be heard running about over a cabin roof or the blow of an axe on a dead stick may cause a flying squirrel sleeping in an old woodpecker's hole to pop its head out. But much watchfulness in a favoured place is necessary to see these little animals gliding from tree to tree in the dim light of the forest at night.

#### References

- Crowe, 1943. *Bull. Amer. Mus. Nat. Hist.* 80, pp. 400-403 (distribution, taxonomy).  
Hewes, 1918. *Can. Amer. Fauna*, No. 44 (outline of habits, revision, bibliography).

#### FAMILY—GEOMYIDAE POCKET GOPHERS

This group of rodents is found only in north and central America. All of the many species are burrowing animals, spending more of their time underground, and all are similar in appearance and rather small in size.

Their food is largely roots and tubers but succulent vegetation is also eaten. The large hair-lined cheek pouches that open outside the mouth are used for transporting food, the young are born in an undeveloped condition.

The pocket gophers carry the earth from their underground tunnels to the surface and leave it in mounds, afterwards completely blocking the entrance to the tunnel. These mounds, or gopher hills are frequently called "mole hills" in Alberta and attributed to moles, though no moles occur in Alberta (as discussed earlier, page 123). Thus, we get a confusion of the names of two subterranean, little known mammals and one common, conspicuous one. Ground



squirrels are generally called gophers and pocket gophers' burrowings (the animals are apparently seldom seen) are attributed to moles.

Pocket gophers are of economic importance locally because they feed on such root crops as potatoes, damage some field crops by eating the roots, and damage irrigation projects with their burrows.

Only one species occurs in Alberta.

**Pocket Gopher.** *Thomomys talpoides* Richardson.

**Diagnosis:** Total length 199-214 mm (7.7-8.2 in.), tail 47-60 mm (1.8-2.3 in.), hind foot 26.5-29 mm (1.1-1.1 in.), skull basal length 34.5, zygomatic breadth 23, a stout bodied, short eared animal with small eyes and ears, very sparsely haired tail, greatly elongated claws on fore feet, fur lined cheek pouches opening outside of mouth, colour above greyish brown, nose greyish, ear patch blackish, underparts buffy to white, tail whitish, winter pelage greyer.

**Geographical Variation.** Many subspecies of this western North American species are known, of which three occur in Alberta.

(1) *Thomomys talpoides talpoides* Richardson. Total length 214 mm, tail 60, hind foot 28 (large male, Bailey), in central Alberta.

(2) *Thomomys talpoides andersoni* Goldman. Total length 199 mm, tail 54, hind foot 29, similar to *T. t. talpoides* in size but paler above and below (Goldman), occurs in southern Alberta.

(3) *Thomomys talpoides lewisi* Bailey. Total length 199 mm, tail 47, hind foot 26.5 (Bailey), smaller and more pale than *talpoides*, smaller and more reddish than *andersoni*, form not well known, apparently occurs south and west of Edmonton.

**Distribution in Alberta.** Locally common in central and southern Alberta, west to the mountains in the south.

**Life History.** Subterranean in habits, active throughout the year, probably about 6 young born in an unde-

veloped state underground, low roots, gathered through burrowing, and green vegetation gathered at the surface, some food stored (Bailey).

**General.** Even when pocket gophers are common they are seldom seen, and the knowledge of their presence is usually known from the mounds of earth thrown out from their burrows. This earth is pushed out ahead of the animal and the entrance is then plugged firmly with earth until it is usually difficult to find the entrance to the burrow. The large cheek pouches are not used for carrying dirt but for carrying food. When filled the apparent size of the head is more than doubled.



Figure 10. Pocket gopher, *Citellus richardsoni*. The study on the left shows the external cheek pouches distended.

Gophers run backward through their burrows with ease, and the stubby tail, probably serves as a tactile organ, as a substitute for eyes in this backward progress in the darkness of the burrows.

Most of the gopher's life is spent underground, going from place to place along the burrows, or making new burrows. The texture of the soil has an important bearing on the distribution of pocket gophers, and in Alberta they are local in distribution.

Bailey has pointed out that in some areas pocket gophers are next in importance to ground squirrels in causing damage to the agriculturists. Pocket gophers eat tubers and all kinds of garden vegetables, most field crops are eagerly eaten either above or below the surface, they destroy many hay crops and leave mounds of dirt that dull or break the knives of mowing machines, and burrow

through the banks of irrigation ditches. However in Alberta their distribution makes these damages very local problems.

#### Reference

HARRIS, 1915. No. Amer. Fauna, No. 28 (summary of habits, etc.)

#### FAMILY—HETEROMYIDAE. POCKET MOUSE AND KANGAROO RAT.

This is an exclusively American family, largely restricted to western North America. The name pocket mouse refers to the fur-lined cheek pouches that have their openings outside the mouth, a character common to the family but shared with the pocket gophers. Some of this family are mouse-like in shape and have a scampering gait, others have greatly elongated hind legs and a hopping gait that have given them the name of kangaroo rats.



Figure 7. Head of Kangaroo rat. From skin, showing openings of cheek pouches.

Correlated with living in a dry habitat some species at least have become practically independent of water for drinking, and Howell and Gersh report that several species of kangaroo rats have been kept in good condition, without water, on a diet of dried oats, for several months, a diet that would not enable white rats to survive a week. However Bailey writes that under best conditions they obtain water from succulent

vegetation, and in captivity learn to drink water.

One species of kangaroo rat is recorded from Alberta, and one pocket mouse may be expected.

(Pocket Mouse, *Perognathus parvus fasciatus* Wied)

Total length 129 mm. (5 in.), tail 56 mm. (2.2 in.); hind foot 17 mm. (Criddle), a small slender mouse with conspicuous fur-lined cheek pouches opening outside the mouth, colour above olive-grey, underparts white bordered

with buffy, recorded in Manitoba and ? in Saskatchewan, and is to be expected in southern Alberta. Bailey (1926, No. Amer. Fauna, No. 49, p. 119) writing of North Dakota says they are small, inconspicuous mainly nocturnal animals of the open prairie, where they live in tiny burrows in the barest situations or on the short grass plains, for unlike most mice they avoid the cover of vegetation. Criddle writing of Manitoba says they prefer sandy soil and the entrances of their burrows are usually hidden in a clump of weeds. (1915, Ottawa Nat., 28 pp. 130-134) ]

**Kangaroo Rat. *Dipodomys ordii* Woodhouse**

**Diagnosis:** Total length 266-282 mm. (10.4-11 in.) tail 143-157 mm. (5.6-6.1 in.) hind foot 43-44 mm. (1.6 in.) Hoffmeister for *D. c. terreus*) hind legs much longer than fore legs, tail long, tufted fur-lined cheek pouches opening outside the mouth colour above dark buff or tawny, white mark above eye by ear and along each hip, underparts white tail dusky above and below, white on sides

The shape and colour pattern are distinctive

**Geographical Variation.** Many subspecies of this western United States species are recognized, and specimens from Alberta have been referred to *Dipodomys ordii terreus* Hoffmeister

**Distribution in Alberta.** Apparently a straggler into the southwest.

**Life History.** Hibernates (?), nocturnal makes burrows, young 3 to 4 in number, food chiefly seeds of grass, grain, and herbs (Bailey)

**General.** Many authors have pointed out that these beautiful, attractive, gentle animals are not rats nor mice, but have as their closest living relatives the burrowing pocket gophers, and are more closely related to squirrels than to rats

Kangaroo rats are animals of open country where they make an elaborate system of burrows from which they wander widely in search of their food. As one would

expert from their form, they travel by hopping on their hind legs, but it comes as a surprise to find that they also climb into tall weeds and shrubs (Bailey).

#### References

Bailey 1936 No. Amer. Fauna No. 55 (Chakr.)

#### FAMILY -CASTORIDAE. BEAVERS

This family contains only two very similar species, one in Europe and Asia and one in North America. They are very large rodents being surpassed in size only by the Capybara of South America.

Beaver are modified in structure for an aquatic existence, with a tail flat as a paddle, permitting the rodents, but the American species is even more specialized in habits. Its cutting of trees and building of dams and lodges has given rise to a vast amount of folklore recorded in the earlier literature. Its valuable pelt was one of the important commodities to the exploration and travel in Canada and in Beaver has a place in the Canadian coat of arms. The Vancouver is reputed an undeveloped condition in a lodge or in a burrow. One species occurs in North America.

#### Beaver- *Castor canadensis* Kuhl

*Measurements* Total length 900-1,088 mm (35.4-42.8 in); tail 270-407 mm (10.6-15.9 in); foot 170-177 mm (6.6-7 in); tail large flat paddle-like and scaly, a cleft claw on second toe of the hind foot; colour, brown above, paler brown below.

*Geographical Location* The beaver is widespread across Canada with variation permitting a number of races to be recognized, of which the following two occur in Alberta.

1) *Castor canadensis canadensis* Kuhl Total length 1,088 mm (43 in); tail 407 mm (16 in); and foot 177 mm (7 in); between, skull basal length 118.8 zygomatic breadth 94 (Benson, averages, northern, central and western Alberta).

2) *Castor canadensis macrourus* Bailey. Total length 900 mm, tail 270, head and foot 170, hind foot length 110, eye socket breadth 87. Bailey type is quite smaller than *canadensis* and much paler and darker brown, skull more than equal in width and in mass and heavy (Bailey), southern Alberta.

*Distribution* - ~~in~~ *Alberta*. Widespread in streams.

*Life History*. Large *Castor* is abundant in the aspen in its dams and houses. 1 to 9, usually 4 or 5 young born after a gestation period of 94 to 128 days. Food, bark of trees, aspen most widely being associated and succulent vegetation, shrubs and for winter.



Figure 71. Beaver

*General*. A typical beaver family consists of a pair of adults the yearlings and the kits. When the young are entering the third spring and are nearly 24 months old they set out for themselves.

Their family home is the lodge, a dam is built to regulate the water supply, making sure the lodge entrance is covered and that there is enough water so that it will

not freeze to the bottom in winter. Trees are felled and a supply of branches cut and laid down under water. When winter comes and the ice is thick the beavers are safe from the natural enemies that can never dig down through the frozen roof of the lodge and when hungry they have simply to swim to their food pole and bring a piece into their lodge to eat at their leisure.

When beaver are protected they have become very tame and it is possible to watch them feeding and swimming about within a few yards.

The beaver was the chief staple of the fur trade in the early days but beaver are so easily trapped that their continued existence as commercial fur bearers was threatened. Tax being treated measures involving closed seasons and areas and trap laws have been put into effect and beaver have been transplanted to areas from which they were exterminated. Under intelligent management they will always yield a rich harvest.

But beavers are not a wave an unmixed blessing. Their dams sometimes block roads and interfere with culverts and bridges. On the main river south where trees are few and jealously guarded beaver cause extreme annoyance by their cuttings as in Milk River town where there used to be a grove of poplars until the beaver cut them.

The total annual value of the beaver taken from Alberta in the period 1919-20 to 1941-42 has varied between \$2,542 and \$174,940. The average annual value per pelt has varied from \$6.24 (1933-34) to \$25 (1926-29).

The Alberta beaver yield is as follows:

Year	No. of pelts	Year	No. of pelts
1919-20	4,806	1930-31	306
1920-21	11,188	1931-32	4,847
1921-22	"	1932-33	9,279
1922-23	1,860	1933-34	4,407
1923-24	20,807	1934-35	1,894
1924-25	12,747	1935-36	416
1925-26	14,000	1936-37	1,307
1926-27	9,143	1937-38	4,888
1927-28	736	1938-39	6,266
1928-29	848	1939-40	4,894
1929-30	555	1940-41	7,702
		1941-42	1,408

## References

- Bailey 1882 U.S. Dep't Agric. Bu. 1 1878. 31 pp. (habits, control, farming)  
 Barbour 194. Beaver Outfit 272 pp. 14 18 (as Catalog on Art.)  
 MacFarlane 1905 Proc. U.S. Nat. Mus. 28, pp. 742-748 (beaver trade and its history in the northwest)  
 Soper, 1937 Jour. Mammal. 18, pp. 1-13 (in Wood, Bull. Park  
 Warren 1937 Univ. So. Mammal. Monog. 2 (general habits)

## FAMILY -CRICETIDÆ

This is a very large assemblage of small rodents that as a group are well represented in the New Wor., and in



Figure 13. (a) White-footed mouse, one of the Cricetidæ.  
 (b) Meadow mouse, one of the Cricetidæ.

the northern part of the Old World, with some members in Africa.

Miller recognizes two subfamilies in the New Worl.



## DIAGNOSTIC EXTERNAL FEATURES OF THE TWO SUBFAMILIES (Based on Alberta species)

Subfamily 1. *Cricetinae*. Ears and eyes large and conspicuous (p. 156)

Subfamily 2. *Microtinae*. Ears and eyes small and inconspicuous (p. 163)

### Subfamily 1. *Cricetinae*. *Cricetine Rodents*

This group has a distribution from the Arctic to Patagonia in the New World, and the greater part of the Palearctic region in the Old World, with members in South Africa and Madagascar (Ellerman). In Alberta four species occur.

The Alberta forms are typical, rat and mouse in shape and appearance. The young are born in an undeveloped state blind naked and helpless in some nest. The food of the adults varies with the species, of the seeds are important, of the herbaceous vegetation in some large, and of the other animals matter chiefly insects seems to be most important. Some store food. Our species is extremely adaptable in habitat requirements whereas others are selective. They are mostly terrestrial but some climb well, all are active throughout the year.

The mice of this group in Alberta mostly come into contact with man when they enter wilderness dwellings, where they cause local damage and loss. Their insect eating tendencies are probably important in keeping down noxious insects affecting forests and grazing. The common species, as a food for some fur bearers, are probably extremely important.

### KEY TO ALBERTA SPECIES OF CRICETINE RODENTS

- (1) Total length over 300 mm. (1) 3 in. 1 tail bushy—bushy-tailed wood rat (*Neotoma arizonae*)
  - (1a) Total length less than 250 mm., 7.5 in., tail not bushy. 2
  - (2) Tail about equal in length of hind foot—grasshopper mouse (*Onychomys leucogaster*)
  - (2a) Tail about three times the length of hind foot, white-footed and deer mice (*Peromyscus maniculatus*, *Peromyscus leucopus*)
- (For discussion of differences between these last two species See page 160)

*Grasshopper Mouse. Onychomys leucogaster* Ward

*Measurements* Total length 141 mm (5.5 in.), tail 37 mm (1.4 in.), hind foot 21 (Saskatchewan female); tail short, thick at the base and tapering; colour above grizzled grey, below white.

The short, thick, tapering tail is the best external character for separating it from the white-footed mouse, which it most resembles.

*Geographical Variation* The grasshopper mice, a western group, extend into Canada only in the southern edge of the prairies. More than twenty forms in two species are recognized, of which only one occurs in Alberta as follows: *Onychomys leucogaster missouriensis* Audubon and Bachman.

*Distribution in Alberta* The south part of the province (Calgary and Medicine Hat Holsters).

*Life History* Probably active throughout the year, largely terrestrial (♂ does not burrow); two litters a year, 1 to 6 young in a litter, born in spring and summer after a gestation period of 31 to 39 days (variable); young weaned at 19 to 24 days; food, as determined by laboratory examination of stomachs, eight northwestern prairie food in which grasshoppers, crickets, caterpillars and moths bulk large; also, caterpillars (other moths); about one northwestern prairie food composed mostly of seeds of grasses and cultivated grains. (Sperry; in captivity store food, sunflower seeds) (Bailey).

*General* These are prairie animals found scattered over the open country in bare and exposed situations as well as where there is cover of weeds and scattered shrubbery. They seem to wander widely and rarely, if there any trail, burrow or sign found that can unmistakably be assigned to them.

Much of our knowledge of them comes from studies of captive animals and though they are unknown to local residents of their range the grasshopper mice have a number of extremely interesting and unusual habits.

Many rodents eat insects and flesh, but the grasshopper mouse depends to a large extent on such food and even attacks and kills other mice for food. Its name comes

from its fondness for grasshoppers. It is said to take the place of the short-tailed shrews and moles as insect eaters in the central part of the continent where the latter are absent.

Not only does the grasshopper mouse have a squeak or bark but it also has a long fine shrill whistle, insect-like in firmness and quality that Bailey heard about his camps on the plains and likened to the wolf howl in miniature.

In captivity it has been observed to take tobacco from a cigar butt, chew it briefly and then parting its fur apply the tobacco to its skin, as though for an insecticide.

#### References

- Bailey 1926 No Amer Fauna No 49 (habits)  
 Bailey and Sperry 1926 U.S. Dept. Agric. Tech. Bull. No 145  
 (habits and food)  
 Howell 1914 U.S. Nat. Mus. Proc. 47 pp. 432-439 (revision)  
 Keith 1926 Jour. Mammal. 17 pp. 172, 173 (howling)  
 Mayr 1940 Jour. Mammal. 21 p. 221 (using tobacco on skin)

#### Deer Mouse, *Peromyscus maniculatus* Wagner

(Also called Wood Mouse, White-footed Mouse)

**Diagnosis.** Total length 158-160 mm. (6 1/8-2 in.), tail 63-71 mm. (2 4/8-2 7/8 in.) hind foot about 20, adult colour above pale ochraceous buffy to greyish cinnamon or drab, below white (or sharply lined), blackish above, white below, a white spot at base of ear often present, worn pelage browner, juvenile pelage grey.

Closely resembling the next species, the white-footed mouse which see for comparisons.

**Geographical Variation.** This is one of the most widespread and variable species of mammal in North America, ranging from the Atlantic to the Pacific coast, and from Central America to tree line in the north. In Alberta are two rather distinct subspecies as well as wide areas from which specimens show intergradation.

(1) *Peromyscus maniculatus borealis* Merriam. Total length 160 mm., tail 71, hind foot 20 (averages, topotypes, Osgood), colour, above greyish cinnamon to drab or hair

brown, much like the midsummer pelages of related forms, white hairs on basal ear tuft usually well developed, under parts creamy white, the legs dusky, almost black above, white beneath (Osgood). The northern part of the province.

2. *Peromyscus maniculatus sagardi* Merriam. Total length 158.5 mm., tail 63.7, hind foot 20.1 (averages Montana Osgood). Like *leucurus* but ear much less, paler, more buffy, whitish on side, slightly smaller tail averaging 41 mm. (Osgood). The plains of the western part of the province.

The animals from the east slopes of the Rocky Mountains are a variable confusing group that show a mixture of characters of the more typical races. *leucurus* from the north-east, agrees in its south-west, and agrees to the west of course. From writers that *californicus* has specimens in this area are the result of the intergradation set forth above.

*Life History.* Active throughout the year, terrestrial and somewhat arboreal, nocturnal, about 3 young born after a gestation period of 22 to 35 days (Sullivan). In some sheltered nest, food of dry seeds, some insects are eaten.

*General.* This is one of the most adaptable mammals in Alberta, along with the cow, the goat, and the wolf. It is found in the northern forests, in the sage brush flats of the southern plains, where it sometimes seems to be the only small mammal, and at timberline in the mountains. There are at times perhaps more of these mice in Alberta than of any other species of mammal. Super estimated that there might be 46,000 animals to the square mile in Wood Buffalo Park. But with this species, as with so many of our mammals, the populations have their ups and downs, sometimes they are scarce, sometimes common.

The big ears, big eyes, graceful shape, and beautiful colour make the deer mouse one of our most attractive mammals. Though nocturnal they are fortunately not shy, and sitting at the door of a tent at dusk, there is always a good chance to see these mice, it is foraging about one's feet, looking for bits of food that have been dropped, or for the crumbs that may have been spread for them.

## References

- Crowe 1943 Bull. Amer. Mus. Nat. Hist. 50, pp. 401-402 (Osgood)  
 Osgood 1909 No. Amer. Fauna No. 28 (Osgood)  
 Soper, 1947 Jour. Mammal., 28, pp. 135-136 (Wood Buffalo Park)  
 S. J. A. 1932 Can. Mamm. Mus. Zool. Mus. Pub. No. 24 (life history study)

**White-footed Mouse.** *Peromyscus leucopus* Rafinesque

**Diagnosis.** Total length 168 mm (6.5 in.), tail 60 mm. (2.7 in.); hind foot 22 (average; Montana, Osgood), colour above ochraceous buff, very lightly mixed with dusky, middle of back somewhat darker than sides but not sharply contrasting, head and face nearly like sides, underparts creamy white (Osgood).



Figure 15. Skull of white-footed mouse and deer mouse (left)

This species is easily confused with *Peromyscus maniculatus oregonus*, the deer mouse that lives in the same area. In colour they are very similar but *P. m. oregonus* is spectrally distinct and is to be distinguished by its smaller size, shorter tail and in most cases by the presence of definite white spots in front of the ears, the tail is also more hairy and sharply bicoloured. In skull characters *oregonus* has a narrower brain case, smaller adital bullae, longer more parallel-sided palatine sets, and smaller molar teeth (Osgood).

**Geographical Variation.** This is a more southern species that intrudes into northern Canada with only one subspecies in Alberta *Peromyscus leucopus aridus* Osgood, to which the above diagnosis applies.

**Distribution in Alberta.** The southern part of the province.

*Life History* Active throughout the year, nocturnal, terrestrial, but climbs well, 1 to 6 young (average about 5) born after a gestation period of 22 to 27 days (Sv. Ala) in some sheltered nest. Food chiefly seeds, some insects eaten.

*General* Osgood writes that though the white-footed mouse lives in arid country, it appears that it lives chiefly in the relatively humid parts, that is, along watercourses and in the slightly wooded places. The more open and arid part of the region is inhabited by the deer mouse (*P. m. osgoodi*). Soper found it comparatively rare on our western prairie, as 11 weeks of trap nights produced only a few examples. On the basis of collected specimens he secured one of this species to twelve deer mice.

#### *References*

Hamilton 1941 Jour. Mammal. 22 pp. 259-263 (rod.)  
Osgood 1909 No Amer. Fauna No. 24 (rodent)  
Soper 1946 Manuscript, survey of prairie mammals  
Sv. Ala 1902 Trans. of Mich. Mus. Zool. Mus. Pub. No. 24 (Life history)

### **Bushy-tailed Wood Rat. *Neotoma cinerea* Ord (Also called Pack Rat)**

*Diagnosis* Size: total length 382-387 mm. (15-15.2 in.), tail 162-167 mm. (6.2-6.5 in.) and feet 43-44 mm. (1.6 in.) a large rat-like animal with a bushy somewhat flattened tail, big eyes and ears, and very conspicuous "sh-shirts", colour above greyish buff to ochraceous buff, the back mixed with darker hairs below white, tail above brownish grey, below white, young much greyer above.

*Geographical Variation* This is a western species with two slightly differentiated subspecies in Alberta.

(1) *Neotoma cinerea cinerea* Ord. Total length 387 mm., tail, 162, hind foot 43 (averages Montana specimens, Goldman), to the extreme south and southwest.

(2) *Neotoma cinerea drummondii* Richardson. Total length 382 mm., tail 167, hind foot 44 (averages Jasper House (Goldman) similar to *N. c. cinerea* but far longer tail more bushy on distal two-thirds, dark colour of fore-legs ending in a sharp line near wrist, in strong contrast

with pure white of feet, skull averages slightly larger, dentition slightly heavier (Goldman) Occurs in the Rocky Mountains south to Banff

*Distribution in Alberta.* The mountains of the west and the Milk River country



Figure 1. Bushy-tailed wood rat.

*Life History.* Active throughout the year, large, nocturnal, terrestrial and good climbers, make large stick nests in rock crevices and buildings, one litter of 2 (sometimes 3 or 4) young a year (Bailey) born after a gestation period of probably about 30 to 33 days (as in related forms), food chiefly green vegetation and some seeds store dry herbaceous plants as food

*General.* The wood rat seems to need the shelter of rocks or of buildings in which to live in Alberta. Though largely nocturnal, it is sometimes abroad during the daylight hours, when watching a rock slide for pikas one may see a wood rat dashing across the rocks with a mouthful of green stuffs for its food cache.

Hollister writes, 'Mountain-rats take readily to buildings, and their nocturnal activity has made them famous among mountain people. The stories of their freakish antics, as told around the evening camp-fire by guides, prospectors, and packers, rival the most exciting bear stories in interest. One packer told of his return to his shack to find his bunk filled with potatoes and dried fruit,

and another of the strange disappearance of large quantities of provisions, which were later found in some ridiculous place, where the park rats had stored them.

"The nests of this mountain form are usually placed on rocky hillides, under large boulders. A mass of sticks, bones and available miscellaneous articles is piled about the nest proper. The nest sites are always ill-smelling places and the animals when killed give off a strong characteristic odour which persists for years in the stuffed skins. In the museum if the door of a case containing bushy tailed wood rats is left open the fact is at once apparent to any one in the room who happens to be familiar with the species."

Though wood rats are said to make interesting pets and their presence adds interest to our mountain wilderness their usurping of cabins and cottages left vacant brings them into disrepute. Having gained entrance, such a building their excrement is found everywhere, and, such a disgusting and nauseating odour that the place becomes uninhabitable.

#### References

- Bailey 1936 No. Amer. Fauna No. 55 (habits in Oregon)  
 Goldman 1919 No. Amer. Fauna, No. 34 (revision)  
 Hochster 1912 Can. Alpine Journal special number pp. 15, 16 (in Jasper area)

#### *Subfamily 2 Microtinae Microtine Rodents, Voles and Lemmings*

The distribution of the microtine rodents is in the northern parts of both the Old and the New World. They form a dominant group, and the number of species and of individuals is very large.

In Alberta eleven species occur. They are small to medium-sized rodents (the largest is the muskrat) with mouse-like shape but with heavy body, short legs, small ears and eyes and, often, short tails (though the tail may be long as in the muskrat). The young are born in an undeveloped condition, blind, naked, and helpless, in a nest in some sheltered place or in a burrow. The habitat requirements of the Alberta species are varied, one is



aquatic the others are terrestrial most of them make burrows and runways, many are grassland animals but some favour arctic treeless country, and some forested areas. Their food is predominantly herbaceous vegetation and some species store food. All are active throughout the year.

In cultivated areas some species of these voles may cause damage by eating green stuff. In irrigation sections the muskrats' burrows damage canals and earthen dams. These damages are usually local. On the whole side from our point of view, is the fact that these voles are very important, being among the agents in the first stage in the process of turning grass into flesh. These rodents are also important as food for some of our important fur bearers, such as weasels, martens and foxes. One of these voles, the meadow mouse is an important fur bearer itself.

Many of these semi-rodents fluctuate greatly in numbers, at some years they may be common other years scarce, and in some areas at least in Canada the scarcity of microtines seems to cause a scarcity of certain furs.

#### KEY TO ALBERTA MICROTINE RODENTS

##### (Voles and their relatives)

- (1) Ear large total length over 400 mm. (13-17 in.), tail as long as head and body, and compressed laterally—muskrat (*Ondatra zibethica*)
- (1a) Smaller total length less than 300 mm. (11-9 in.) tail shorter than head and body, and round 2
- (2) Colour reddish brown or chestnut 3
- (2a) Colour larkish or greyish brown 4
- (3) Thumb ear strap-shaped and about equals hind foot—brown running (*Lemmus trimaculatus*)
- (3a) Thumb with claw, and about same hind foot—red-backed mouse (*Clethrionomys rufopus*)
- (4) Tail as long as longer than hind foot 5
- (4a) Tail distinctly longer than hind foot 6
- (5) Colour light buff grey pale side (*Lemmus americanus*)
- (5a) Colour dark or rufous brown northern hog-sucking (*Synaptomys borealis*)

- (6) A distinct chestnut-coloured patch on side of nose—chestnut-checked vole (*Microtus xanthognathus*)
- (6a) No such patch ..... 7
- (7) Total length over 200 mm. (7.8 in.)—Richardson vole (*Microtus richardsoni*)
- (7a) Total length less than 200 mm. (7.8 in.) ..... 8
- (8) Tail about three times length of hind foot—long-tailed meadow vole (*Microtus longicaudus*)
- (8a) Tail about twice length of hind foot ..... 9
- (9) Colour grizzled black and grey, backing distinct brownish tawny—upland vole (*Phenacomys tinnis*)
- (9a) Colour grizzled brownish ..... 10
- (10) Lower molars with re-entrant angles of about equal depth on inside and outside of teeth (Figure 77)—short-tailed meadow mouse (*Microtus pennsylvanicus*)
- (10a) Lower molars with re-entrant angles very much deeper on inside than on outside of teeth (Figure 77)—*Phenacomys* vole (*Phenacomys intermedius*)

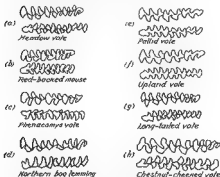


Figure 77 Enamel pattern of molars of (a) meadow vole, (b) red-backed mouse, (c) *Phenacomys* vole, (d) Northern bog lemming, (e) pallid vole, (f) upland vole, (g) long-tailed vole, (h) chestnut-checked vole

**Northern Bog Lemming.** *Synaptomys borealis* Richardson

**Diagnosis.** Total length 129-131 mm (3-5 l in.), tail 25-26 hind foot 18. Colour above grizzled brown to grey below slaty. In old males white hairs on flank glands conspicuous. Teeth with diagnostic molar pattern (See Figure 77 & 78) with molar pattern composed entirely of transverse wedge shaped loops with deep re-entrant angles on the inner side of the teeth and hardly a trace of external re-entrant angles. The upper incisors are grooved (Figure 78).



Figure 78.  
A rodent upper  
incisor of bog  
lemming.

The general vole-like appearance and colour, the short tail (less than twice the length of the hind foot) in old males the white flank spots and the tooth characters are diagnostic.

**Geographical Variation.** This is a northern North American species with a dark brownish race in northern Alberta and a duller greyer race in the mountains of the southwest, as follows:

(1) *Synaptomys borealis borealis* Richardson. Total length 129 mm, tail 26 hind foot 18 (Howell averages for Northwest Territories specimens). Colour above very rich and dark particularly mixed with black tipped hairs. Richness of colour more pronounced on rump (Howell), occurs in northern Alberta south to Edmonton.

(2) *Synaptomys borealis chapmani* Allen. Total length 131 mm, tail 25 hind foot 18 (Howell averages for specimens from west of Henry House) a dark but dull coloured race with only a slight tinge of chestnut (Howell), southwestern Alberta.

**Distribution in Alberta.** Northern and central Alberta, and the mountains of the west.

**Life History.** Active throughout the year, makes runways in grass and nests of bogs and forests, young 2 to 7 in a litter (judging from embryo in Alberta specimens) born at various times in spring and summer in Alberta, feed apparently herbaceous vegetation.

**General.** Rarity is the thought that usually comes to mind in connection with these little animals. Soper writes

that in Wood Buffalo Park in 75,000 trap nights he collected only five specimens. However locally on the east slopes of the Rockies they may be quite common. Since a place was found in 1945. It was in the little sphagnum-shrubby glades in the spruce forest along a tributary of Bow River. Here, lengths of grass cut up by voles, runways and burrows of voles were everywhere. Some of these signs were probably made by such voles (*Microtus*) and not probably by this species as five brown lemmings (four adults and one young) were taken one night as well as a number of meadow voles.

It is a striking paradox that most of our life history studies of small mammals are based on dead animals. But such is the case and it is collectors' notes on the labels of specimens as to where specimens were taken, the food that was in their mouths and stomachs, whether or not females were gravid, and if so the number of embryos, on which our knowledge of such forms as this is built.

#### References

Hewitt, 1937. No. Amer. Fauna, No. 60 (revision).

**Brown Lemming.** *Lemmus trimacronatus* Richardson.

**Diagnosis.** Total length 159 mm (6.2 in.); tail 23 hind foot 21 (Davis, averages); colour above tawny to chestnut, grizzled with black, brighter on the rump; nail on thumb flat and strap-shaped.

The bright, red-brown colour, the short tail about the length of the hind foot and the strap-shaped thumb nail are distinctive external characters.



**Geographical Distribution.** This is a northern species of the tundra extending southward in the mountains as far as western Alberta where the bright colour form occurs, to which the above diagnosis applies, and which is called

(1) *Lemmus trimacronatus helveticus* Richardson

**Distribution in Alberta** The northern part of the mountains in the west.

**Life History** Let's see throughout the year does not turn white in winter in the north 3 to 9 very hard at any time of year in a nest of grass food probably chiefly grasses, sedges, and herbs.

**General** The known breeding colonies related to the Norwegian lemming which is so well known for its habit of increasing greatly in number in certain years and then making mass migrations. When these migrating colonies reach the sea they are said to swim straight out as a rule.

The Stanwell Fletchers, writing of north-central British Columbia, indicate that in the mountains the lemmings also fluctuate greatly in numbers reaching plague proportions in some years. When plentiful they were found in many and varied types of habitat, not only above timberline in alpine meadows but in rock slides, sphagnum bogs in valley bottoms, in forests and an unusual habitat record is included "four were found in the stomachs of Dolly Varden Char." Their runways connect and wind in every direction for considerable distances. Green cuttings of grass cover the floor of the deeper recesses of the burrows, which are also of considerable length, one of the burrows measures a little over 11 feet in length.

#### References

- Davis, 1944. *Mammals* 23, pp 19-25 (revision).  
 Stanwell Fletcher 1943. *Our Papers BC Prov Mus*, No 4, pp 89, 90.

**Phenacomys** Vole. *Phenacomys intermedius* Merriam

**Diagnosis** Total length 135-138 mm (5 3/4-5 1/2 in.), tail 32-34 hind foot 17 mm. colour above grizzled brown, with or without yellow on sides of nose (varying with the subspecies) below grey feet pale to white tail dark above, pale below, the diagnostic features as in the skull most obvious in the cranium, pattern of the molars (See Figure 77) in which the transverse loops of the lower molars have the re-entrant angles on the inner (tongue) side much deeper than the outer re-entrant angles.

For positive specific identification recourse to the tooth pattern is necessary. That of the lower molars sets this species off sharply from all other Alberta microtines.

The molar pattern of these species is most closely approached by *Synaptomys*, and the differences are apparent in the figures. In addition *Synaptomys* has grooved upper molars in contrast with the non grooved molars of *Phenacomys*.

*Geographical Variation* Howell in his revision had three species *P. intermedus*, *P. Mackenzii*, and *P. ussuriensis*, that replaced each other in a northern cline extending across America. Anderson considers *usssuriensis* and *intermedus* to be comparable and Crowe has shown that *intermedus* and *mackenzii* intergrade. It seems advisable to recognize one polytypic species for the forms formerly grouped under these three species names and with this concept we have in Alberta two well marked races.

(1) *Phenacomys intermedus lewis* Howell. Total length 135 mm. tail 34, hind foot 17 (Montana averages Howell). A tawny yellowish on sides of nose, the slopes of the Rocky Mountains.

(2) *Phenacomys intermedus mackenzii*, Preble. Total length 138 mm. tail 32, hind foot 17 (Fort Smith averages Howell). Face red with more good skin differences such as the strongly depressed rostrum, etc. the northern and central part of the province intergrading with *P. lewis* in the northern foothills of the Rocky Mountains.

*Distribution in Alberta* The northern and central part of the province and the Rocky Mountains of the west.

*Life History* Active throughout the year. 4 to 5 young in a litter, probably more than one litter a year (Alberta data). Food apparently green vegetation.

*General Use* The bog screenings this is usually considered one of the rarities in the catch of the small mammal collector. Soper in his intensive work in Wood Buffalo Park did not find this species though Preble had taken it there earlier. But again like the bog screenings it is not uncommon at times at least on the east slopes of the Rocky Mountains where series have been taken in open

grassy pine forests, in mossy pine forests in spruce forests, and at timberline. Sometimes it is taken where there are no evident signs of runways, sometimes where there are runways through the grass and burrows in the moss that might have been made by it or one of the three or four other microtine species that occur there.

#### References

- Crowe 1943 *Bull. Amer. Mus. Nat. Hist.*, 80, p. 403 (shows *P. intercedens* intergrades with *macconnelli*)  
Howell 1936 *Ne Amer. Fauna*, No 48 (revision).

#### Red-backed Mouse. *Clethrionomys gapperi* Vigors

**Diagnosis.** Total length 123-145 mm (4 8-5 7 in.) tail 31-41, hind feet 17-19, back brownish red, sides ye owl brown, underparts whitish, a brown-backed colour phase occurs occasionally that must be identified by its skull: the skull is smoother and weaker than in most other of our microtines, and the enamel pattern of the molars is characterized by the rounded, rather than angular loops (See Figure 77)



Meadow vole

Red-backed Mouse

Richardson vole

Figure 80 Dorsal view of skulls of left meadow vole, middle, red-backed mouse, right, Richardson vole.

**Geographical Variation.** This is a wide ranging, northern forest species, that is represented by three subspecies in Alberta, with intergradation with a fourth in the western mountains.

(1) *Eutamias amoenus ruber, atabascus* Preble. Total length 145.6 mm., tail 40.6, hind foot 18. (averages. Fort Chipewyan specimens. Preble.) The northern part of the area.

(2) *Eutamias amoenus rufus, pinus* Merriam. Total length 145 mm., tail 43.6, hind foot 18.2 (Colorado average. Bailey.) A large slightly larger, in the southern part of the Rocky Mountains in Canada.

(3) *Eutamias amoenus rufus, pinus* Bailey. Total length 120 mm., tail 31.5, hind foot 17.9 (averages. North Dakota. Bailey.) A small brightly colored form. Central Alberta eastward.

(4) *Eutamias amoenus rufus, saturatus* Richards. Total length 149 mm., tail 45, hind foot 18.2 (averages. Bailey.) A large, long-tailed form with larger ears and slender hind feet. Occurs in British Columbia intergrading with Alberta forms on the east slope of the Rocky Mountains.

**Distribution in Alberta.** Northern and central Alberta and the western mountains, as indicated, also present in the Cypress Hills.

**Life History.** Terrestrial, active throughout the year. Several litters of 2 to 7 or more young born during the summer, gestation period 17 to 19 days (Chenblat). Nest in a burrow or under a log or other shelter, food green vegetation and seeds.

**General.** The red-backed mouse is a forest animal, and is one of the commonest of Alberta small mammals, though not as widespread as the deer mouse. In Wood Buffalo Park Cooper estimated from 8,000 to 16,000 a year more to the squirrel than to the marten. It is probably one of the important food items of such fur bearers as the marten.

Though largely nocturnal they are frequently seen about by day and Bailey writes as to one of the rare good fortune he had south of our border in Montana:

"Early one morning when camped in the Big Snowy Mountains in Montana I was watching the Pine Squirrels climb to the tallest spruce tops to warm themselves in the first rays of sunlight, when the leaves moved and out came an *Eutamias* (red-backed mouse) only a few feet away



After eyeing me intently for a moment he began to move about as freely as if I had been a stump. His ears were erect and constantly changing position. His eyes were bright and prominent, and his nose and whiskers were in constant motion. His colour harmonized beautifully with the reddish-brown leaves and the yellow and grey stems of dry grass as he scampered from one plant to another reaching up to bite off the stems, and then running myself up on a fluffy round bud to eat from his hands, while keeping one eye on me" (Bailey).

#### *References*

- Bailey, 1897. Proc. Biol. Soc. Wash. 11, pp. 113-127 (reviewed).  
 Crowe 1943. Bull. Amer. Mus. Nat. Hist. 83, p. 464 (Rocky Mountain taxonomy).  
 Reppert 1942. Jour. Mammals 23, p. 127.

#### **Short-tailed Meadow Vole. *Microtus pennsylvanicus* Ord.** (Also called Meadow Mouse)

**Diagnosis.** Total length 147-171 mm. (5 7/8-6 6 in.), tail 35-48 mm. (1 4/8-1 8 in.), hind foot 18-21. Above dark, grizzled brown, greyish and black, below grey. The skull character that is distinctive is the molar pattern, with the small posterior loop on the second (middle) upper molar (See Figure 77).

**Geographical Variation.** In Alberta the northern and western animals are dark, those from the prairies average paler, allowing the two following races to be recognized:

(1) *Microtus pennsylvanicus drummondii* Audubon and Bachman. Total length 147.1 mm. (tail 36) and foot 18.7 (averages, Jasper specimens), ranges over most of Alberta.

(2) *Microtus pennsylvanicus insperatus* Allen. Total length 171 mm., tail 47.8 and foot 20.9 (averages), paler and larger than *M. p. drummondii*, ranges in the extreme southeast and part of the province.

#### *Distribution in Alberta* Widespread

**Life History.** Active throughout the year, several litters a year of 4 to 8 young born after a gestation period

of about 20 days, in a nest in a tussock of grass or under some shelter, food largely green herbaceous vegetation, some seeds and some insects.

**General.** As their name implies the meadow voles favour grassy places. There they make their little runways and tunnels. If the grass is dense, one may have to bend aside the grass to see them. Where the ground is mossy the little trails leading from burrow to burrow on mossy banks may be conspicuous. And there are additional signs of their occurrence in the little heaps of short lengths of grass at the burrow entrances, or just inside them.

On the arid plains themselves these voles are absent, but where there is water and consequently green grass, the voles are there even if it is only an oasis in a thirsty plain.

Where the country is well watered they become common.

Populations of as high as 70,000 meadow voles to the square mile were estimated by Soper in Wood Buffalo Park. However like so many animals these have their years of abundance and the years of scarcity and there seems to be a regularity about it, the period from one peak of abundance to the next being about 4 years. For some fur bearers such as the red fox these voles are very important as food.

#### References

- Bailey 1900. No. Amer. Fauna, No. 17 (revision).  
 Bailey 1924. Jour. Agric. Research, 27, pp. 523-535 (biology).  
 Hamlin 1940. Scientific Monthly 50, pp. 425-434 (biology).  
 Rand 1943. Can. Field Nat. 57, pp. 115-123 (revision Canadian forms).  
 Soper 1942. Jour. Mammal. 23, pp. 137-138 (Wood Buffalo Park).

#### Long-tailed Meadow Vole. *Microtus longicaudus* Merriam

**Diagnosis.** Total length 184 mm (7 in.); tail 68.3 mm. (2 5/8 in.); hind foot 20.3 (averages southeast British Columbia); colour above grizzled brownish grey and black, below greyish. For tooth pattern see Figure 77 and note lack of posterior loop on middle upper molar.

The relatively long tail about three times the length of the hind foot, and the greyish colour of the fur are rather distinctive external characters.

**Geographical Variation.** This western species which includes the forms earlier known as *M. mordax* is represented by one known subspecies in Alberta.

(1) *Microtus longicaudus collaris* Allen. Ranges in the Rocky Mountains.

However two specimens from the vicinity of the Cypress Hills indicate that a different isolated population may occur there.

**Distribution in Alberta.** The Rocky Mountains (common) and the Cypress Hills area (rare).

**Life History.** Active throughout year, 4 to 6 young in a litter and several litters a year. Alberta data, probably gestation period: 1 about 21 days as in related forms. Food chiefly herbaceous vegetation.

**General.** At the outlet of Medicine Lake near Jasper a great rock slide covered the bottom of the valley, and in places there is much short dense green grass. Here meadow voles were everywhere. Fifth pathways cut in the grass leading from one rocky shelter to the next, piles of greenish droppings, and little heaps of grass stems cut into short lengths. Here the mice were active in the open during the morning apparently trusting to the proximity of cover into which to dart for shelter at the first alarm. Several were seen running about and Howard Clemens watching quietly had one come run under a rock on which he was sitting and look about uneeringly.

The habits of this vole seem to be much like those of the short-tailed meadow vole, but it is perhaps more common at higher altitudes and favours drier habitats, though both are sometimes found together in both wet and dry habitats.

#### References

Anderson and Rand 1943. Can. Field Nat. 37 pp. 19-21 (revision, Canadian forms).

**Chromatic-checked Vole.** *Microtus orestophilus* Leach

**Diagnosis.** Total length 210 mm. (8.25 in.) tail 90 mm. (3.5 in.), hind foot 27 (Bailey), colour above dark grizzled brown and black sides of nose and ear patch

bright rusty yellow or chestnut. Facial pattern of molars much as in *M. longicauda* (Figure 77) but middle lobe of molars more widely separated (about two triangles).

The large size of the eyes and the chestnut colour on the head are distinctive external characters.

*Geographical Variation* None recorded.

*Distribution* on *Albion*. The northern part of the province which is the southeastern end of its range.

*Life History*. Probably similar to that of other voles as many as 11 embryos have been reported in a pregnant female. Food probably green vegetation and bark. Prehistoric records have taken *P. pratensis* about as a favour to man!

*General*. What we know of this northern woodland vole can be put up a few words. In the National Museum we have only two specimens but taken by Dr. M. Y. Willson in 1905 from leaves of *Sparganium angustifolium* for it in Woods, Buffalo Park, and yet very similar to one Preble was sent to Athabasca, 1900, and a country near Fort Smith and two twenty miles there. This is only a preliminary step. In an open woods looking outwards about a mile south of a road. The ground was a mixture of moss in this place, in the woods or marshy, and evidently were quite deep as I saw nearly a metre of dirt at the extreme edge of a large barrow. From the barrow there well-tracked runways extended in various directions to a distance of 50 to 75 yards, only rarely reaching wet or even damp ground. As a rule only a pair was taken in one set of runways." (Preble)

In regard to another colony on the Athabasca 20 miles above Peace Bridge Preble writes: "It must have comprised many thousands of individuals and occupied a heavily wooded area of east half a mile square on the gently sloping shore of a river."

Evidently the species fluctuates greatly in numbers and some student in the future may find this interesting.

#### Reference

Preble 1903. N. Amer. Fauna No. 27 (not in Woods Buffalo Park area).

**Richardson Vale. *Microtus richardsoni* DeKay**

**Diagnosis.** Total length 248.8 mm. (9.7 in.), tail 74.2 mm. (2.9 in.) and foot 27.9 (averages, Alberta) above grizzled greyish brown and black, below greyish skull very angular and spreading, with enamel pattern of incisors much like that of *M. longicaudus* (Figure 77).

The large size is distinctive; the spreading, angular skull is also diagnostic (Figure 80).

**Geographical Variation.** This species of the western mountains has several subspecies recognized but only one occurs in Alberta.

1. *Microtus richardsoni richardsoni* DeKay

**Distribution in Alberta.** Higher altitudes in the Rocky mountains.

**Life History.** Four to 8 young in a litter, more than one litter a year, food probably largely herbaceous vegetation.

**General.** This giant meadow mouse is an animal of higher mountain streams. Holister writes of one colony on the headwaters of Smoky River. They were found to inhabit the banks of a glacial stream just below timberline. The underground tunnels and runways were all close to the streams and were evidently filled with water at times. The burrows were of large size, the lateral surface openings often being 5 to 6 inches in diameter and were placed in thickets of alder and willow. A few large, well-defined surface runways were also seen. Small heaps of fresh cuttings of plants, chiefly the stems and tops of blue lupine were found in the runways.

*References*

- Holister 1932. Can. Alpine Jour., Special number, pp. 24-25 (habitat, Jasper area).  
Anderson and Rand 1943. Can. Field Nat. 57, pp. 108-109 (review of Canadian forms, breeding data).

**Upland Vale. *Peromyscus minor* Merriam**

**Diagnosis.** Total length 128 mm. (5 in.); tail 30 mm. (1.1 in.), hind foot 16.7 (averages, North Dakota, Bailey) colour above grizzled, uniform, clear poppery

grey from a combination of black and whitish tipped hairs; belly washed with soiled white or pale buffy, tail sharply bicoloured dusky above buffy below; feet grey (the less slightly brown in summer, young darker); skull light and narrow, cranium pale to pinkish (figure 47) with the last upper molar with only two closed triangles as in the following species (contrast it thus as in the preceding forms) and the first lower molar with three closed triangles and two open triangles (instead of five closed triangles as in the preceding and following forms); the last lower molar usually has three transverse keels as in preceding forms but occasionally there are two transverse keels and a median pair of triangles as in the following species.

Size and colour are good characters for recognition.

*Geographical Distribution.* None recognized.

*Distribution in Alberta.* The southeast part of the province north to Edmonton.

*Life History.* About 8 young in a litter, probably several litters a year; food probably largely herbaceous stems and leaves and some roots and bulbs (Bailey) at one food (Griddle).

*Notes.* Although abundant at times, the upland vole is local in occurrence. In habitat it prefers dryer grasslands than does the short-tailed meadow mouse, and it seems to live more in burrows than does the latter. Super writes that in places the home groups of little burrows that may number up to a dozen or more may be in scant grass that furnishes it little or no protection, and the well beaten runways connecting the burrows and leading off to feeding grounds in denser grass are conspicuous. Frequently he writes it was possible to stand in the midst of a colony and easily trace with the eye their little worn runways to distances of 10 and 15 feet so evident were they. As with some others in this group of voles, they seem to be nearly as active by day as by night.

Griddle in Manitoba found that the least weasel was one of the important enemies of the upland vole. Three mouse homes that were under observation were taken possession of during the winter by least weasels and the

inhabitants quickly destroyed. In one such weasel-prempted mouse nest there were found in April six dead upland voles. The homes of twenty-seven mouse communities were examined at this time and all were found to have been entered by weasels, the mice having been killed and partly eaten in each instance. And here we see one factor at work reducing a large mouse population. For Criddle writes "From being an abundant animal the species was reduced to insignificance in the course of a few weeks."

#### References

- Bailey 1926 No. Amer. Fauna, No. 47 ( habits in North Dakota )  
 Criddle 1925 Can. Field-Nat., 39, p. 145 ( habits in Manitoba )  
 Soper, 1927 Manuscript notes

#### Pallid Vole. *Lemmus curtatus* Cope

**Diagnosis.** Total length 128 mm (5 in.), tail 20, hind foot 18 (Soper southern Alberta and Saskatchewan averages), colour above pale buffy or ashy grey, whitish below. Skull flat and wide in enamel pattern of molars note the last upper molar with two closed triangles, first lower molar with five closed loops, and last lower molar with two transverse loops and a pair of median triangles (Figure 77).

Size, colour, and short tail, about length of hind foot, are good characters for identifying this species.

**Geographical Variation.** This is a species largely of the western United States, intruding into the southern Canadian prairies, where the subspecies represented is

- (1) *Lemmus curtatus pallidus* Merriam

**Distribution in Alberta.** The arid plains of the south-east, north to Calgary (Bailey).

**Life History.** Several litters of about 5 young a year (Saskatchewan data, Soper), food, sage bush leaves and other herbaceous matter, and in Saskatchewan chiefly "rabbit-bush" (*Chrysothamnus graveolens* (Soper)).

**General.** Up to 1927 the National Museum had only three fragmentary specimens of this species, one had been taken from the nest of a long-eared owl, one from the

takens of a pigeon hawk and one from the entrance of a harrising owl's burrow. Then Soper, studying the many tracks of the plains, collected thirty-nine of them for me.

Soper found it in the treeless area of the semi-arid, short grass plains scattered over with small cacti and sage brush. Its presence was easily detected, its little burrows about the roots of sage bushes and well trodden trails over the sun-baked land were conspicuous. It was extremely local in distribution, however and only here and there were these little colonies found. In each of these the number of burrows and the runways would have led one to believe that a large number of mice were active there but each time only one adult female with a number of young, presumably from earlier litters were taken in each colony.

#### References

- Soper 1931. Can. Field-Nat. 45 pp. 200-214 (Observations and habits of Saskatchewan)  
Hall 1938. Jour. Mammal. 9, pp. 201-204 (Summary of habits)

#### Material. *Onychomys leucogaster* Leconte

**Diagnosis.** Total length 496-530 mm. (19.5-21 in.), tail 232-240 (9.2-4 in.), hind foot 73.5-74.5 (2.8 in.), colour above brownish black below paler, tail about as long as head and body, much compressed, hind foot enlarged, not webbed but with a fringe of hair to aid in swimming.

The size and shape of the tail are distinctive.

**Geographical Variation.** This species ranging from Nova Scotia to British Columbia varies enough to enable several races to be recognized, of which the two following occur in Alberta.

(1) *Onychomys leucogaster spatulatus* Osgood. Total length 330 mm., tail 232, hind foot 74.5 (averages Hollister), of north and central Alberta.

(2) *Onychomys leucogaster caninus* Hollister. Total length 496 mm., tail 240, hind foot 73.5 (averages, Hollister), a smaller paler form (also with skull differences) of the waterways of the southern plains.



*Distribution in Alberta* Throughout the province where suitable marshes occur very local but occurs even in the arid, barren of the south-east.

*The Habitat.* A hole, largely vertical, and composed of broken branches & burrows with underwater entrances, two or more. It takes a year or about 6 young each for a pair in United States, food herbaceous vegetation. It is carnivorous and its signs



FIGURE 31. Muskrat

*General.* The muskrat is an overgrown meadow mouse that has taken to living in the water. With a thick waterproof coat, long ears, small eyes, for swimming and a long, rounded tail, it has become one of the most well fitted for its aquatic existence.

As dusk approaches, it emerges from its daytime retreat in a hole in a bank or in the mound-shaped house it has made out in the marsh. If a person sits quietly on the bank the muskrat will swim by within a few yards and perhaps even climb out on the bank to feed. Like gigantic meadow mice in shape.

The muskrat fur though fitting it for its environment nevertheless has its drawbacks for a muskrat for it is prized for human wear too.

Muskra's are profitable animals and able to stand a great deal of trapping. But a variety of factors such as the drying up of waterways and vast tracts wipe them out over considerable areas as at Lake Superior and as happened in Manitoba. Reclamation projects and marsh management such as those in Manitoba (King Meadow) have resulted in turning dried out unproductive waste areas back into productive marshes where populations of fifteen muskrat to the acre have been built up and the average yield is four rats to the acre (K. et al.). This was on large areas of over 50,000 acres. On smaller areas in Ontario the yield has been higher. On a Lake Saint Clair marsh where about 1,200 acres are intensively managed the yield is about eight muskrats to the acre which apparently is excessive for few areas in the United States. It is interesting in this connection to mention that on the Lake Saint Clair marsh the average number of muskrats to each muskrat house was 2.7.

In Minnesota a study by McLean indicated that though most female muskrats bore about twelve young a year only about half of these lived to trappable age. He further found that a reduction by trapping in December of not more than 50 per cent of the population was safe.

In a study by Brown it is shown that considering Canada as a whole since about 1850 there has been a strongly marked cycle in numbers of muskrats, with an average period of recurrence of about 30 years. The peak years since the beginning of the present century according to this study are 1900-01 1912 1921-1922 1928-33. However the period of abundance in northern and southern Alberta did not always coincide.

The total annual value of the muskrat taken from Alberta in the period 1919-20 to 1941-42 has varied between \$125,514 and \$688,540 the annual average value per pelt has varied from \$0.40 (1931-32) to \$2.08 (1941-42).

## The Alberta muskrat yield in its furrows

Year	No. of pelts	Year	No. of pelts
1919-20	298,763	1931-32	312,977
1920-21	413,812	1932-33	388,291
1921-22		1933-34	544,808
1922-23	735,663	1934-35	404,428
1923-24	331,144	1935-36	397,026
1924-25	371,632	1936-37	274,640
1925-26	310,714	1937-38	189,285
1926-27	306,499	1938-39	237,224
1927-28	360,016	1939-40	391,779
1928-29	527,566	1940-41	328,747
1929-30	274,811	1941-42	289,845
1930-31	530,036		

But the muskrat is not always a welcome addition to ponds and waterways. Where irrigation is practised, and water held by earthen dams, as in parts of southern Alberta, the muskrat burrows damage the installations and the presence of the muskrats can not be tolerated.

## References

- Allen, 1902. Trans. Seventh No. Amer. Wildlife Confer., pp. 263-27. (Manicoba's marsh and muskrats, management.)  
 Elliot and Nicholson, 1942. Jour. Animal Ecology 11 pp. 88-126 (Muskrats in Canada).  
 Hewitt, 1902. Trans. Seventh No. Amer. Wildlife Confer., pp. 277-283 (Muskrats and marsh management in Ontario).  
 Holister, 1911. No. Amer. Fauna No. 32 (revision).  
 Johnson, 1923. Henshaw's Wildlife Bull., vol. 3, pp. 199-220 (life history, New York).  
 McLennan, 1941. Jour. Mammals, vol. 22, pp. 52-63 (Manicoba, weights, age and sex, possible harvest).  
 Stephens, 1945. Can. Geog. Jour., 20, pp. 11-19 (a popular account of Manicoba's muskrat-marsh reclamation and ecology).

## FAMILY MURIDAE OLD WORLD RATS AND MICE

The centre of abundance of this group is southern Asia. The entire group of a great many species (there are more than 500 named forms listed in the genus *Rattus* alone according to some authors) was originally completely Old World in distribution, but three species have been brought to Canada by man's activities: the Norway or house rat, the black rat and the house mouse. Of these,

two have reached Alberta. These live in and about buildings are prolific, bearing several litters of young during the year in a nest in some sheltered place. The young are blind and naked at birth. Their food is whatever man leaves available, and by destroying or eating foodstuffs and their merchandise these animals may do considerable damage. There is also the possibility of their carrying disease.

**Brown Rat.** *Rattus norvegicus* Linnæus

(Also called Norway Rat, House Rat)

**Diagnosis.** Total length 407 mm. 16 in.), tail 175 mm. 6 8 in.), hind foot 41 (adult male from Quebec, , tail long and scaly, fur coarse, colour above grizzled grey, below grey.

The size, and the practically naked, hairy tail, are distinctive.

**Geographical Variation.** Several subspecies have been described in the Old World. Presumably the form introduced into eastern Canada is from Europe, that into western Canada could perhaps be from the Orient. Present material available makes it unprofitable to go into the question.

**Distribution in Alberta.** Recorded from Edmonton and Camrose, likely to occur in other cities apparently not well established.

**Life History.** Several litters of up to 12 young each born after a gestation period of 21 to 23 days (Kenneth), food vegetable or animal food used by man and available in storage or as discarded matter.

**General.** The brown rat competes directly with man for food, in a brigandish sort of way, and fairly successfully, it is extremely difficult to control, and when attacked it defends itself savagely. Bailey has summed up



Figure 82. Upper trapezium of (a) white footpad masses showing tubercles in two rows and (b) brown rat showing tubercles in three rows.

their traits as "sly filthy habits, mean appearance and vicious disposition." There is also the probability of conveying disease.

Be that as it may, the brown rat and its smaller relative the house mouse are thoroughly disliked. And one result is that all animals bearing the name either 'rat' or 'mouse' have the same stigma of contamination transferred to them. If only the native small rodents graceful in form and beautiful in colour had other names than rats and mice they undoubtedly would seem more attractive and be better known despite most of them being shy nocturnal creatures not easy to know.

In return to our brown rat on purely economic and anti-fur grounds it can not be tolerated and every effort should be made to keep this invader from becoming established. However this group of rats has been very useful to man. The ordinary white rats kept as pets and used in experiments in applied biology, feeding and medical studies are all members of related species.

#### References

- Lantz, 1909. The Brown Rat in the United States. U.S. Biol. Surv., Bull. No. 33.  
 Soper, 1941. U.S. Dept. Interior, Fish and Wildlife Service. Wildlife Circular No. 8—a summary of habits, economic status, and control.

#### House Mouse. *Mus musculus* Linnæus

**Diagnosis.** Total length 185 mm (7.3 in.), tail 97 mm (3.8 in.); hind foot 26 (adult male from Nova Scotia), ears and eyes fairly large; tail practically naked; colour above grizzled greyish brown; below brownish grey.

The grizzled brown colour above, and the brownish grey underparts are fairly good external characters in distinguishing this species from the white-footed and deer mice that are most likely to be confused with it in this area.

**Geographical Variation.** Many forms of house mouse have been described for a discussion of the forms imported into America see Schwartz and Schwartz, 1943, *Jour. Mammal.*, vol. 24, pp. 59-72.

*Distribution in Alberta* Established in the central part of the province at least.

*Life History* Several litters of about 3 young born yearly in a nest in some sheltered place usually in buildings, gestation period about 20 days.

*General* The house mouse is a w. spread species in parts of the Old World with some forms that live in close association with man, and with others that do not. It was brought to America in ships and traveling in goods and is hence everywhere. In central Alberta at least the species is established in settlements and has been found at a distance from human habitation in grassy fields and aspen groves.

In houses they are a nuisance grow up and destroy foodstuffs, clothing and bedding and gnawing holes. Usually their ravages are easily contained in houses by the use of a few mouse traps.

The white mice kept as pets are almost of this species.

#### *References*

- Lat. B. R. 1927. Univ. Cal. Pub. Zool. 30, p. 189-203 (on break in California, role of insects, etc.)  
 Shwartz and Schwartz 1943. Jour. Mammals 24, p. 39-72 (geographical variation)

#### FAMILY ZAPODIDAE JUMPING MICE

This family has been united with that of the true jerboas of Africa, but the latter are more specialized jumping rodents, and the Zapodidae a better kept as a separate family with representatives in the northern part of the Old World and in North America. It is not numerous as to species. The distribution of the subfamily Zapodinae to which our species belong is peculiar, there are two genera in North America and related forms in China.

These mice with long hind legs and very long tails are jumping animals of grassland and desert.

Peterson writes that the statements of earlier writers that these animals leap 4 or 5 yards is exaggeration, but they do possess remarkable leaping powers and when disturbed will leap 6 or 8 feet. He goes on to say that

these mice do not follow beaten runways, as do many small mammals, but seem to wander rather indiscriminately, availing themselves to some extent of natural pathways and open places. However they are sometimes taken in meadow mouse runways and when travelling slowly do not take long hops.



Figure 88. Jumping mouse: the inset shows the grooved upper incisors.

These animals hibernatic during the winter usually in burrows and nests and the undeveloped young are born in such nests (though grass nests are sometimes built in the grass, usually in late summer).

The habitat of jumping mice is either rich grassland or forest, apparently the vicinity of water is necessary and some of them at least are not adverse to swimming (Davis, and personal record).

The food of these animals is largely vegetable seeds, succulent grasses, and fruits, but some insect matter is eaten.

In Alberta are two species that seem to replace each other geographically.

#### KEY TO ALBERTA SPECIES

(This is only suggestive, See page 188 for comparisons.)

- (1) Total length 240 mm. (9.5 in.) or over, skull more robust with heavier molars and larger incisors (common) western jumping mouse (*Zapus princeps*)

- (2) Total length 212 mm (8.3 in.) or under; skull less robust with lighter molars and smaller zygomatic foramen.—Hudsonian jumping mouse (*Zapus hudsonicus*)

**Meadow Jumping Mouse.** *Zapus hudsonicus* Zimmerman

**Diagnosis.** Total length 212 mm (8.2) tail 126 mm (4.9 in.) hind foot 29 mm (1.1 in.) Wood Buffalo Park specimens superior tail longer than head and body, and foot very long; colour back grizzled brown sharply contrasting with tawny sides and joints creamy white, skull light and slender with light molars and small zygomatic foramen (Figure 84)

The long tail and long hind foot will distinguish this species from all similar sized rodents except the next, which see for comparison.

**Geographical Variation.** This species ranges from Nova Scotia to Alaska and has a number of recognized forms, of which only one occurs in Alberta as follows:

1. *Zapus hudsonicus hudsonicus* Zimmerman.

**Distribution in Alberta.** The northern part of the province.

**Life History.** Hibernates, one or perhaps two litters of 3 to 6 young a year, food succulent grasses, fruits, seeds, and some insects.

**General.** Preble found a few jumping mice in what is now Wood Buffalo Park in shrubby woods bordering a marsh. There one afternoon he watched one for some time hopping about in some willows. It moved quite cautiously, making jumps of only 2 or 3 feet. However, Soper found the species very scarce when he visited the area years later.

**References**

- Hamilton, 1834 Amer. Mus. Nat. Hist. 18, pp. 187-200 (Zahra)  
Preble 1899 North Amer. Fauna, No. 15 (revision)

*Meadow jumping mouse*



*Rocky Mountain jumping mouse*

Figure 84. Skulls of two species of jumping mouse.



**Rocky Mountain Jumping Mouse. *Zapus princeps* Allen**

*Desmussa* x. Total length 219-240 mm. (8.5-9.4 in.), tail 130-144 mm. (5.1-5.6 in.), hind foot 30-31 mm. (1.1-1.2 in.). It is distinguished by leaping with long thin feet and long tail. It has a dorsal stripe of grizzled brown contrasting with buff or ochraceous sides. Belly white, skull robust with heavy molar teeth and large incisive foramen (Figure 84).

The long tail, thin feet and a hair pattern well separate this form from all but the Hudsonian jumping mouse. From the latter it is separable by its longer and larger ears and more pronouncedly by the larger more robust skull with heavier molar teeth and larger incisive foramen (Figure 84). *P. princeps* is also slightly darker above and less richly colored on the sides than is *Zapus hudsonicus*.

*Geographical Variation.* Of the several forms of this western series the one represented in Alberta

(1) *Zapus princeps alakensis* Davis. Total length 240 mm. (9.4 in.), tail 144 (Davis), the mountains north at least to Jasper Park.

(2) *Zapus princeps sonori* Prehne. Total length 219.6 mm. (tail 130.7, hind foot 30.1 (averages, Saskatchewan and Alberta). Smaller, a smaller paler animal of the plains, north to the Fort Entrance (Prehne).

*Distribution.* In Alberta. The southern part of the province and the mountains of the west.

*Life History.* Hibernates, probably a single litter of 4 to 8 young a year (own, probably chiefly small seeds and some fruit).

*General.* "Aside from *Microtus mordax* the long-tailed vole we found the jumping mouse the most common runner of the open meadow country above timberline. While visiting plantations in the open meadows of the Moose Pass country we sometimes startled jumping mice in the grass. When frightened in this manner the animals sometimes jump five or six feet at a single bound" (Hollister).

As well as living above timberline it is common in glades in the forest and in the edge of the mountains.

where forest gives way to plains, but in the main country itself, however, this jumping mouse is uncommon according to Soper and probably only occurs where there is water and tall grass.

#### References

- Davis 1926 Jour. Mamm. 13: 1-221 227 (transverse)  
Hollister 1912 Can. Alpine Jour. 4: 1st number pp. 26-27 (occurrence, Jasper area)  
Pridde 1899 N. Amer. Fauna No. 13 no. 1 (most of volume not extant)

#### FAMILY ERICHTHIDONTIDAE NEW WORLD PORCUPINES

This family and its name in the New World is puzzling only in species mentioned as far as the United States and Canada. In the Old World, are porcupines but they belong to a different though related family and their spines are much longer than ours and as effective weapons as those of the New World species.

Most of the New World species are arboreal, some have prehensile tails. The most striking thing about them is their skins, which are like a quilt or their dorsal ridges. It is said that is apparent so that quills is an old Indian word for quills. But the quills are effective armor. They are grown along with the skin, are sharp and barbed. The Canadian porcupine when attacked turns its back to its foe and erects its quills. If an Indian dog bites the dog's tail, it is likely killed with the sharp spurs. And yet it is in danger before it turns its back, for the latter sensing the approach of an enemy, may only swing its muscular well armed tail and put a number of rings in the meaty skin of the dog. Some animals, however have learned to kill porcupines, notably the fisher and the cougar and the wolf, the bear and others occasionally kill and eat them.

#### Canadian Porcupine. *Erethizon dorsatum* Linnaeus

Dorsaque Total length about 800 mm. 31.4 in. tail about 230 mm. 9 in. hind foot about 115 mm. 4.5 in. A stout bodied animal with a short stout tail, short legs, plantigrade feet and long, strong, curved claws dorsal

pelage thickly covered with barbed spines; underparts thinly haired & but above varies with the subspecies and also individually. Stomach generally blacked with some of the long guard hairs tipped with white or some shade of yellowish; the amount of this light is very variable; some specimens appear mostly yellowish, some mostly blacked (stomach and face).<sup>2</sup> Factors are correlated with their quills which are of less black tipped & color of underparts blackish or brownish.

*Geographic Variation.* This species ranges from Nova Scotia to Yukon and several races are recognized by a combination of skin and skull characters of which the following three are representative in Alberta:

(1) *Erethizon dorsatum mayopi* Merriam. Total length 800 mm. tail 220 hind foot 114 (Alaska males); this form has the general color of brown rather than blacked; some animals are quite blackish in appearance where the skin the yellow is only a very brown etc. Alberta at present only no specimens from West Buffalo Park, no skins for identification and it is the form with a tendency toward the eastern subspecies *E. d. dorsatum*. More material, but skins and skulls are needed.

(2) *Erethizon dorsatum nevadense* Cooper. Total length 802 mm. tail 240 hind foot 116 (British Columbia male); general color more blackish than in *E. d. mayopi* and animals with a more orange-yellow, less rusty yellow tinge to the ventral tipping and a reddish only moderate extent than a less variability in this form than in *mayopi* there are also good skull characters, suitable the mountains of the west.

(3) *Erethizon dorsatum sporanthum* Brandt. Like *E. d. mayopi* but with yellow in pelage greenish yellow rather than rusty yellow. Inhabits the plains; additional specimens needed.

*Distribution in Alberta.* Over most of the province but local in the plains of the southeast.

*Life History.* Arboreal and terrestrial, largely nocturnal; sleeps both in trees and in caves. 1 or sometimes 2 young born after a gestation period of about 6 to 7

months (Taylor who questions Strothers data that 16 weeks is the gestation period) young well developed at birth and active soon after. Skulls soft at birth but harden on exposure to air may suckle for 7 weeks, but weaning begins very early (Taylor)



Figure 83 *Castor canadensis* (a) a quill (b) base and barbed tip enlarged

*General.* The porcupine is an unfortunate creature. With a well developed coat of spines that has afforded him protection from many enemies, a food supply that is always available summer and winter, and an amazing indifference to climatic changes, he should be one of the

happiest of all our woodland creatures. Yet he is a solitary creature without friends. For a short time in the autumn, during the rutting season, males and females come together, in the spring the young accompany the mother but it is quickly worn and soon comes her. For the rest of the year the animals are solitary.

To our fur and neighbors his nature is another. He cuts the bark of trees to the heart's marrow he chews up the packers' sackbary and in small places he chews up installations and boxes to the disgust of the woodsman. He has no beauty of manner or grace of movement no winning way to endear him to the heart of the sentimentalist.

He does have some good qualities nevertheless, and these are not only the purely economic ones of being a source of food to some Indians (Halter) a potential source of food to a lot of woodland weasels and a source of supply of porcupine quills for decorating buckskin. As Taylor writes: "The porcupine is an asset for its bizarre appearance and unusual habits. If it were an unknown exotic we would go to great lengths to keep it in our zoological gardens even at considerable cost for its capture, transportation and care. Why should we not be willing to sacrifice a little timber for the sake of maintaining this native woods creature in localities where it is not doing appreciable damage? As Bailey says: Porcupine blades and an occasional porcupine along the way help to make the forest interesting."

#### References

- Anderson and Rand 1943. *Can Jour Research*, vol. 20, pp. 293-309 (geographical variation in Canada)  
 Taylor 1935. *Univ. of Arizona, Biol. Ser.* Bull. No. 3, 177 pp (monograph on habits)

## ORDER LAGOMORPHA. HARES AND THEIR RELATIVES

The mammals in this order were at one time included in the rodents, but in addition to the evident character of having an extra pair of incisors in the upper jaw they also have good anatomical differences.

SYNOPSIS OF FAMILIES IN ALBERTA  
(Based on species in the province)

Family 1—*Ochotonidae* Pikas Small size length about 170-200 mm. (6-6-7 3 in.) ears broad but not greatly elongated, hind legs about same length as forelegs (p. 193)

Family 2—*Leporidae* Rabbits and Hares Size medium length about 380-600 mm. (14-9-23 6 in.) ears very long, hind legs much longer than forelegs (p. 196)



Figure 84 (a) white-tailed jack rabbit (b) snowshoe rabbit  
(c) cottontail rabbit (d) pika

FAMILY —*OCHOTONIDAE* PIKAS

This family is more plentiful as to species in the Old World, in Asia and extreme eastern Europe, than in the New World where only three species are found. In the New World, pikas are found only in western North America, from Alaska to southern California.

In America they are variously called pikas, rock rabbits, and conies. The name coney is also applied to the English rabbit and to myx, and it seems better not to use it for these animals. The word pika, which has been in common use in Europe for some species of this

*famaly* is much to be preferred it is from the vernacular of the Tunguses—a tribe living in northeastern Siberia (Howell).

The three species that occur in North America are geographical representatives of each other.

In Alberta there is only one species.

*Pika Ochotona princeps Richardson*

(Also called Rock Rabbit and Coney)

**Diagnosis.** Total length 177-191.6 mm (6.9-7.5 in.) hind foot 29.4-30.5 mm (1.1-1.2 in.), colour above pinkish or brownish grey grizzled with black more grey posteriorly ears black margined with whitish, underparts whitish.

The small broad ears and lack of an external tail are distinctive.

**Geographical Variation.** This is a species of the mountains of western United States and Canada and many races are recognized of which three are represented in Alberta according to Howell though Crowe shows the races are not well defined in this area. The following is Howell's treatment.

1) *Ochotona princeps princeps* Richardson. Total length 191.6 mm hind foot 30.5 (averages Jasper area, Howell), in the Rocky Mountains in the Jasper area.

2) *Ochotona princeps infuscata* Howell. Total length 177 mm hind foot 29.4 (averages Canmore Howell) similar to *O. p. princeps* but smaller and decidedly paler, in the Banff area.

3) *Ochotona princeps scura* Howister. Total length 183 mm hind foot 30.5 (averages, Waterton Lakes, Howell), like *O. p. infuscata* in size but darker and more buffy in colour (Howell) in the Waterton Lake area.

**Distribution in Alberta.** In the Rocky Mountains.

**Life History.** Active year round, diurnal terrestrial, living in rock slides, 3 to 4 young (Colorado) food herbaceous vegetation and leaves of shrubs, stores food.

Concerning Rock slides are the favourite haunts of the pika, whether the rock slides are high above timberline or low in the forest. Pikas are to be found and in at least one of the rock slides that reaches Waterton Lake. Often the first suggestion of one's presence is their little bleating cry, perhaps coming from the depth of a rock slide beneath one's feet. If the intruder withdraws and sits quietly watching he may see the pika come up and perch on the crest on top of a big boulder where it harmonizes so well with its surroundings that it takes a keen eye to pick it out. Every now and then it may raise its head to give voice to its little "beek" or bleat. Usually reassured by the intruder's withdrawal it may go scampering about over the rocks with a half-hopping, half-running gait that suggests a cottontail and recalls the pika's relationship with the rabbit.

But if the pika does not run out of its rocky retreat soon it can often be enticed out by making a squeaking noise such as that produced by pressing the tips against the back of the hand and drawing in the breath sharply. Soon the pika answers and in a few minutes may be sitting on the top of a boulder within a few yards of one.

Even if pikas can not be seen or heard evidence of their occurrence is often conspicuous in the form of their little haystacks not to be confused with pack rat caches tucked under the shelter of some rock or in the presence of their droppings little rounded hard pellets about the shape and size of B.B. shot.

The haystacks are perhaps the most unusual things about the pikas. In late summer and autumn they gather quantities of herbaceous plants and twigs of shrubs, and store them under rocks projections where they dry, are safe from the weather and are presumably the animal's supply of food for the winter.

#### References

- Rossell, 1924 No. Amer. Fauna, No. 47 (revision)  
 Merriam, 1942 Jour. Mammals, 34, pp. 284-290 (habits, weights, etc., in Colorado)



## FAMILY LEPORIDAE RABBITS AND HARES

Rabbits and hares are found naturally in most parts of the world except the Australian area into which common rabbits from Europe have been introduced, absent from Madagascar.

They are terrestrial animals that travel by a series of leaps; they are sometimes seen abroad by day but are more active in the twilight and at night. They are active throughout the year. Their food is vegetable, herbaceous material bark and twigs varying with the season. The upper grinding teeth are farther apart than the lower grinding teeth so that these animals chew with a side-wise movement of the lower jaw. Some northern species change colour from white in winter to brown in summer.

The young of hares are well developed at birth, covered with fur and soon active, the young of rabbits are born in an undeveloped naked, helpless state. Hares usually stay above the ground at most resting in a form; rabbits customarily burrow or take shelter underground.

The members of this family are of considerable importance as food as sport, as furnishers of pelts for fur and for the making of felt and as an important item in the process of turning vegetation into flesh for the use of carnivorous animals including some valuable fur bearers.

Since the discovery of tularemia among rabbits has shown the danger to human beings of this disease, special care should be exercised in handling any rabbits. Examination of the liver and other internal organs of the rabbits will usually show if they are healthy and suitable for food. Thorough cooking should be ensured to render rabbit meat safe as a food. Bailey, 1936.

The domestic rabbit is derived from the common wild rabbit *Oryctolagus cuniculus* Linnaeus of southern Europe and North Africa.

In Alberta there are three species of this family

## KEY TO ALBERTA SPECIES OF RABBITS AND HARES

- \*1) Pelage white (winter pelage) 2
- \*1a) Pelage brown 3
- (2) Ear over 90 mm (3.5 in.) long from notch - red-tailed jack rabbit (*Lepus townsendi*)
- (2a) Ear less than 70 mm (2.75 in.) long from notch - snowshoe hare (*Lepus americanus*)
- \*2) Upper surface of tail white - white-crowned jack rabbit (*Lepus townsendi*) (summer)
- \*2a) Upper surface of tail brownish or blackish 4
- \*4) Hind foot less than 100 mm (3.9 in.) - cottontail rabbit (*Sylvilagus nuttallii*)
- \*4a) Hind foot more than 120 mm (4.7 in.) - snowshoe hare (*Lepus americanus*) (summer)

Snowshoe Hare. *Lepus americanus* Erxleben

(Also called Snowshoe Rabbit. Varying Hare. Bean Rabbit.)

**Diagnosis.** Total length 436-489 mm (17.1-19.2 in.), tail 41-43 mm (1.6 in.), hind foot 133-147 mm (5.2-5.7 in.), ear from notch 62-67 mm (2.4-2.6 in.), colour in winter, white with black tips to the ears; colour in summer, grizzled brownish above, tail above blackish, chin white, throat brownish or buffy, under side of body and tail white.

The size, blackish upper side of tail, and back of neck being about same colour as back, not contrastingly rufous are distinctive characters.

**Geographical Variation.** The species ranges from Nova Scotia to British Columbia, and a number of races are recognizable, of which four are represented in Alberta, as follows:

(1) *Lepus americanus americanus* Erxleben. Total length 470 mm, tail 43, hind foot 133, ear from notch, 62 (averages Nelson), in the central part of the province.

(2) *Lepus americanus macfarlanei* Merriam. Total length 489 mm, tail 42, hind foot 147, ear from notch 67 (averages, Nelson). A lightly defined race characterized by being larger in size and darker in colour occurs in the northern part of the province.

(3) *Lepus americanus columbianus* Rhoads. Total length 436 mm. tail 41 and foot 135 ear from notch 86 (averages Nelson). A small form with large ears and hind feet and in summer pelage with a distinctive dingy yellow colour to the body (Nelson) in the Banff and Jasper areas of the Rocky Mountains.

4. *Lepus americanus* *holi* of Hayden. Total length 459 mm. tail 39 and foot 146 ear from notch 70 (averages Nelson). Not nearly the same as the typical one, it has but ears and hind feet longer, colour in summer less or more grey and more dusky or dusky reddish brown (Nelson) in extreme south west Alberta.

*Distribution* in Alberta. Over the wooded and brushy areas of the north and central parts of the province, the mountains of the west and southwest and an isolated population in the Cypress Hills.

*Life History*. Terrestrial, crepuscular and nocturnal; young are born pelleted and fur covered at birth and active soon afterwards, three to perhaps five litters of young yearly. Young 1 to 8 (average 3-4 per litter) gestation period about 30 days (Coddie); 38 days (Lynn); young suckle 2 weeks or longer (Coddie); feed in summer herbaceous vegetation, in winter a great variety of twigs and bark.

*Coolest*. Snowshoe hares reach the peak of their even of abundance about every 10 years. Soper writes of one such period in central Alberta. "October had come with no snow. The rabbits had already wholly or in part denuded the snow-white cover of winter and were consequently very conspicuous against the mellow browns of the autumn woods. At every turn during my ramble they popped up here and there and scurried for fresh cover. Not only in singles but often two and threes started up, scarcely has one received the impression of the previous fleeing object than perhaps another startlingly rockets out from nearly underfoot stirring up several more. After a preliminary dash alarm gave place to caution and the rabbits stopped to look about. They appear bold or indifferent because of their very numbers."

In the Rocky Mountain region on Hay River Soper built a cabin in 1913, and had a truly notable visitation of rabbits to his camp clearing. "As dusk descended rabbits came from every direction. One sparkling moonlight night they visited the clearing in unusual numbers. All seemed imbued with a spirit of festive joviality, dashing about with playful pranks and short sallys. Some fed, some frolicked as games of tag, but a rigid alertness never for a moment ceased. Always one or more of the company sat erect on its haunches, alert ears forward nose aquiver, sniffing the implications of the night. One ominous sound or sign was enough to scatter the merry assemblage. At one time we counted twenty five in easy view, double that number were possibly present."

It is very different in years of scarcity, then one may walk for hours or even days, without seeing a rabbit, while everywhere signs and gnawed branches testify to their earlier abundance.

The question of how the brown summer coat changes to the white winter coat is one that has been much discussed, but recent studies by Lyman have definitely shown that the brown coat is shed and is replaced by a white one in the autumn, and in the spring the white coat is shed and a new brown one replaces it.

In recent years rabbit skins have had a small value on the fur market and many have been taken, the flesh of the snowshoe rabbit is used by woodland dwellers, especially by Indians as food for humans and food for dogs.

#### *References*

- Chesley and Nicholson 1942 Can. Field-Nat. 57, pp. 64-69 (annual report on resources in Canada with references to earlier reports).  
 Coddie, 1938 Can. Field-Nat., 52, pp. 21-40 (life history Musculata).  
 Lyman 1942 Bull. Mus. Comp. Zool. vol. 93, p. 293-350 (petage changes).  
 MacLulich, 1937 Univ. Toronto Studies, Biol. Ser., No. 43 (Biontations).  
 Nelson, 1909 No. Amer. Fauna No. 29 (revision).  
 Soper 1923 Jour. Mammals, vol. 2, p. 102 (notes on abundance Alberta).

**White-tailed Jack Rabbit. *Lepus townsendi* Bachman**

**Diagnosis.** Total length 605 mm. (25 9 in.) tail 92 mm. (3 6 in.) hind foot 149 mm. (5 8 in.), ear from notch 95 6 mm. (3 7 in.) averages. Season, size large body heavy legs and ears long, colour in winter white, with black tips to the ears, in summer yellowish or greyish brown above tips of ears black, tail, above and below, white underparts of body white.

The large size, long ears and in summer the pale colour and the white upper side of the tail are distinctive characters to separate this species from its nearest relatives.

**Geographical Variation.** This species reaches its northern limits on the plains of the Prairie Provinces where only one subspecies, to which the above diagnosis applies, occurs. It is

**(1) *Lepus townsendi campestris* Holister**

**Distribution in Alberta.** The prairies of the central and southern parts of the province north to about Edmonton.

**Life History.** Active throughout year, nocturnal and crepuscular young 4 to 6 in a litter (Bailey), well developed at birth, food chiefly herbaceous plants and in winter twigs of shrubs also feed on growing crops and haystacks.

**General.** During the day the jack rabbit sleeps in the shelter of some bush or tuft of grass or hollow. Startled it goes bounding away over the plains as conspicuous as an antelope. Single bounds may cover as much as 17 feet 10 inches (Bailey). Then it stops, the ears go down, and the animal sinks flat and one wonders how such a conspicuous animal has so completely disappeared on the flat, open prairie.

In winter in southern Alberta, they are said to come into alfalfa stubble to feed and to come about feed stacks. Mr. H. Hargrave says that he has seen as many as 100 about a feed stack at night. In the winter of 1944-45 good winter pelts of jack rabbits were said to bring the few ranch hands who were gathering them about 65 cents apiece.

## References

Nelson, 1909 No Amer Fauna, No 26 (revision, under name *L. campestris*)

Cottontail Rabbit. *Sylvilagus auduboni* Bachman

**Diagnosis.** Total length, 385 mm; tail 46; hind foot 95.4; ear from notch 55.8; averages. Nelson: colour above grizzled grayish brown; nape more rufous; and rump more grayish; tip of tail brownish; throat brownish, rest of underparts white.

**Geographical Variation.** Southern Alberta is the northern limit of the range of this species and the subspecies is *Sylvilagus ruffellii* grangeri Allen.

**Distribution in Alberta.** The extreme south, north at least to Cypress Hills and Vermilion (Soper).

**Life History.** Vetserna and crepuscular; active throughout the year, young 4 to 6 in a litter; undeveloped and naked at birth (Bailey); food herbaceous material and bark and twigs.

**General.** The best lands and the broken ground around the edges of coulees in the arid southeast part of the province is the home of the cottontail. At dusk the cottontail emerges from the crevices and holes in the dry mud banks or from among the rocks and forages over the short grass plains among the cactus. In places the ground is littered with their droppings. But they do not venture far from their shelters, and at the first alarm they dash back to sit at the mouth of their burrows and a further alarm sends them made to safety.

Their habitat overlaps that of the snowshoe rabbit in the bench of the edge of the Cypress Hills and it overlaps that of the jack rabbit along the edges of the coulees in the plains, but it utilizes underground shelter in a manner that neither of the others does.

## References

Bailey, 1906 No Amer Fauna, No 36 (habits of the species in Oregon)

Nelson, 1909 No Amer Fauna, No 26 (revision)

## ORDER—ARTIODACTYLA CLOVEN-HOOFED ANIMALS

This order of cloven-hoofed animals includes the deer and cattle-like animals and also such exotic groups as guinea fow, kangaroos, camels and giraffes.

Three families are represented in Canada, all of which occur in Alberta: the deer family, the pronghorn family, and the cattle family.

### SYNOPSIS OF FAMILIES OF ARTIODACTYLA IN ALBERTA (Based on species occurring in province)

Family 1—*Cervidae* Deer and their relatives. Size, medium to large (for the family); height at shoulder over 30 inches (750 mm.); the males, and the females in some species with deciduous branched solid antlers, feet with lateral hoofs as well as main pair, canine teeth present or absent (p. 202).

Family 2—*Antilocapra* Pronghorn antelope. Size medium (for the order); height at shoulder 30-36 inches (750-904 mm.); males (and often females) with branched deciduous horn sheaths and an unbranched permanent horn core, only the main pair of hoofs, without lateral; rudimentary hoofs on each foot; canine teeth absent (p. 213).

Family 3—*Bovidae* Cattle, sheep and their relatives. Size medium to large (height at shoulder over 35 inches (877 mm.)); males and females with unbranched permanent horn sheaths on permanent horn cores, cloven hoofs with auxiliary lateral hoofs; canine teeth absent (p. 214).

### FAMILY—CERVIDAE DEER, ETC.

The deer family is widely spread over Europe, Asia, the Americas and North Africa. Some of our species have very similar representative species in the Old World: the moose of North America is very similar to the Old World elk, our wapiti or elk is very similar to the Old World red deer, and our caribou are very similar to the Old World reindeer. It is well to call attention here to the confusion

in the use of the word *elk*. In the Old World it is applied to a moose-like animal, whereas in the New World it is applied to the wapiti, a red deer-like animal. Our white-tailed deer and mule deer are American only.



Figure 67. Some big game mammals. (a) white-tailed deer, (b) moose, (c) male deer, (d) caribou, (e) highhorn sheep, (f) elk, (g) buffalo, (h) Rocky Mountain goat.

The deer are distinguished by the peculiar character of their antlers. With the exception of a few Old World species, the males have antlers, and these are solid and are shed completely and renewed annually. When growing



the antlers are covered with a layer of modified skin that is rich in blood and easily injured. This is called "velvet" and antlers still covered with it are called "in the velvet." When the antlers are full grown this "velvet" is stripped off by the animals rubbing the antlers against bushes and tree trunks, exposing the solid core. As already mentioned there are a few aberrant Old World deer without antlers, and in the caribou reindeer group the females of some species have antlers (though much smaller than those of the male) and some do not.

The antlers are evidently connected with breeding, and not primarily with protection against enemies, judging by the period during which they are serviceable, that is, during the rut or breeding season after which they are shed.

The young of the deer are born in a well developed condition and are active soon after birth. The young of many species have a spotted first pelage, a character that some deer in the Old World retain throughout life.

The members of this family have not been extensively domesticated, but in northern Eurasia the reindeer is an important domestic animal, and an attempt is being made to introduce the animal and the culture of herding it into our Arctic. As a supplier of meat and the material for buckskin clothing to wilderness dwellers in Canada two members of this family, the caribou and the moose are very important. Our species also rank high as big game. Locally certain species may cause damage to crops and to haystacks.

Seven species of this family occur in Alberta.

#### KEY TO ALBERTA SPECIES OF DEER

(A.—Based on antlers)

- |   |   |
|---|---|
| (1) Antlers with palmations   | 2 |
| (1a) Antlers without palmations   | 3 |
| (2) One large main central palm from which most of the points rise—moose ( <i>Alces americana</i> )   |   |
| (2a) Antlers widely branching, with small palmations near tips of some of the branches—caribou ( <i>Rangifer</i> ) (See page 115 for comparison of the species) |   |

- (3) Main beam sweeping upward and backward—elk (*Cervus canadensis*)
- (3a) Main beam sweeping upward and forward 4
- (4) Main beam with upturned end, spikes—white-tailed deer (*Odocoileus virginianus*)
- (4a) Main beam with upright spikes, one of which is forked—mule deer (*Odocoileus hemionus*)

(B—Based on general appearance)

- (1) Shoulders higher than hips, muzzle inflated, colour blackish legs and head, antlers on legs (adult ♂ ft 11.8 metres) at shoulder (*Alces americanus*)
- (1a) Shoulders no higher than hips, muzzle not inflated, size variable ♂ ft 1.3 metres or less at shoulder 2
- (2) Neck dark brown, body pale brown (*Cervus canadensis*)
- (2a) Neck not darker than body 3
- (3) Colour blackish brown to whitish, neck whitish or with whitish ventral fringe, whitish band on feet above hoofs, neck with dewlap (*Rangifer*—see page 200 for comparison of species)
- (3a) Colour greyish brown or yellowish brown 4
- (4) Tail dark above, white below, often carried erect, tail wide and plume-like (*Odocoileus virginianus*)
- (4a) Tail white with black tip, rarely carried erect, tail cylindrical, not wide and plume-like (*Odocoileus virginianus*)

### Elk—*Cervus canadensis* Erxleben

(Also called Wapiti)

**Diagnosis.** Total length 7 to 9 feet (2.1-2.7 metres); tail 2 to 3 inches (50-76 mm); height at shoulder about 5 feet (1.5 metres); male only with antlers. The antlers have typically a main backward sweeping beam ending in a point, and five main prongs rising from it (Figure 87). Younger males have smaller antlers with fewer prongs, antlers shed in the winter and renewed in the spring and summer, an upper canine tooth present in both male and female. No ear, sides of body yellowish brown, rump patch lighter, head, neck, underparts and legs much darker brownish; young calves are spotted.

The big elk with his characteristic spread of antlers is unmistakable. The size of the animal, the pale-coloured body with the dark head and neck are also distinctive.

*Geographical Variation.* The subspecies that occurs in Alberta is *Cervus canadensis nelsoni* Bailey.

*Distribution in Alberta.* Very common in the foothills and the Rocky Mountains of the west, occasionally seen in the Cypress Hills area (spreading from a Saskatchewan introduction) and a number under fence in the Elk Island National Park.

*Life History.* Mates in the autumn, 1 or sometimes 2 young born in the spring, food, twigs, seeds, grasses, herbs, bark, leaves, and other plants.

*General.* The elk is an animal of the open forests and glades. The bawling or whistling of the bull elk in the early autumn is the signal that the males are coming down from the higher altitudes to join the bands of females in the valley bottoms, and that the rut is starting. Each male rounds up, and attempts to hold a band of females. Savage fights occur between the males, and sometimes one of the combatants is killed.

The bands of elk spend the day in the shelter of the forests of aspen or pine, and at dusk come out into clearings to feed. Driving along parts of the Banff Jasper Highway in the autumn it is possible to see scores of them in the evening or the early morning.

The bull elk is a magnificent game animal that has an open season on it in parts of Alberta. It is the New World representative of the red deer of Europe.

The elk has increased tremendously under protection and in places causes the ranchers concern by its ravages on haystacks. In the winter whole bands come to some such stacks, and the amount of hay they eat and damage is considerable.

#### References

- Audubon 1938. Trans. Third North American Wildlife Conference, pp. 399-406 (status in Canada).  
Greene 1923. Can. Field-Nat., 47, pp. 104-111, 125-133, 144-147 and 173-174 (life history, Manitoba).

**White-tailed Deer.** *Odocoileus virginianus* Boddaert.

(Also called Virginia Deer and Long-tailed Deer.)

**Diagnosis.** Total length 1,803 mm. (70 3/8 in.) tail 330 mm. (13 1/8 in.) hind foot 508 mm. (19 9/16 in.) weight 180 pounds (adult male). North, Dickinson, Goldman and Kellogg for *O. o. dorsatus*, male with deciduous antlers that have a main beam sweeping upward and forward from which rise erect tines. Figure 87. Metatarsal glands on hind legs are small and simple. Fur is generally greenish brown or reddish brown, upper side of plume-like tail the same, under part of body and under side of tail white. The young fawns are spotted.

The abbreviated spiculated tines of the antlers, the shape and extent of the tail, and the size and position of the metatarsal glands are distinctive.

**Geographical Variation.** Audubon refers the white-tailed deer from southern Alberta to *Odocoileus virginianus dorsatus* Goldman and Kellogg but says that lack of specimens from so distant Alberta from Waterton to Jasper, do not permit definite assignment of the populations in that area and they may be referable to the western race *Odocoileus virginianus columbianus* Bailey.

**Life History.** Antlers shed in winter and grown again in the spring and early summer; male in the autumn usually 2 young born in the spring; gestation period 184 to 188 days; omnivorous food, twigs, leaves, grass and herbs.

**General.** When the alarmed white-tailed deer goes bounding away its tail usually stands straight up and it is a great snowy banner that leaves no doubt of identity. It is generally uncommon and local in Alberta, but in the conifer and aspen forests in the Cypress Hills Mr. Dexter Champion estimates there may be four or five hundred deer, half of which are probably this species. They are also present in the dry shrubbers along the coulees some distance from any forest.

In winter in the Cypress Hills they gather into bands that usually keep separate from the mule deer. Sometimes a band of as many as 75 white-tailed deer is seen feeding at some haystack, according to Mr. Champion.

## Reptiles

Bailey 1932. Nature Mag 21 pp 123-126 (general)

Cowan 1938. Cold Fish and Game, 22 pp 133-140 (distribution and taxonomy with some bibliography)

### White Deer *Odocoileus hemionus* Rafinesque

(Also called Black-tailed Deer, Jumping Deer, Juniper)

**Diagnosis:** Total length 1755 mm (69 in); tail 152 mm (5.9 in); hind foot 555 mm (21.8 in); ear from crown 235 mm (9.2 in); weight 174 to 456 pounds; males with deciduous antlers of which the main beams sweep upward and forward with upward pointing tines, one of which characteristically forks again giving a double fork; a roared head from Alberta has a length of outer curve of right antler of 30 inches and a spread of 20 inches (Fig. 21); females normally do not have antlers; ears very large, tall, short and cylindrical; metatarsal gland high up on hind leg; colour generally brownish or yellowish grey; forehead dark brownish, some whitish about muzzle and on throat; chest blackish; white rump patch; tail with a black tip (Figure 87).

The double branching of the upright tines of the antlers, the shape and colour of the tail, and the size and position of the metatarsal gland will distinguish the species from the white-tailed deer.

**Geographical Variation:** A number of subspecies are recognized of this western North American species, of which one (to which the above diagnosis applies) occurs in Alberta as follows: *Odocoileus hemionus hemionus* Rafinesque.

**Distribution in Alberta:** Widespread, from Milk River to Wood Buffalo Park, most common in the mountains of the west.

**Life History:** Mates in the autumn, with 2 young born in the spring, feed twigs of bushes and trees, grasses, herbs, and leaves.

**General:** The male deer rarely raises its tail as it bounds away and when it does, the tail appears as a little black-tipped stub very different from the snowy,

plume-like tail of the white-tailed deer. When going at full speed the deer travels with a peculiar bounding gait that has given to it the name of 'jumper'.

Many of the deer that live in the mountains go to higher altitudes in the summer though a few are to be found at low elevations all summer. In winter they all come down into the lower valleys and gather into large bands. In protected areas they become very tame.

It is said that the male deer that is now found to the northern borders of the province and beyond has spread there from the south only in the early part of the present century.

The male deer is a game animal of some importance. In parts of the province it causes annoyance to some ranchers, and gives pleasure to others from its habit of gathering about haystacks and feeding on them in winter.

#### References

- Cowan 1926. California Birds and Game, vol. 22 pp. 124-126 (taxonomic distribution and long bibliography).  
 Soper 1912 Jour. Mammal. 22 : 141 (cows and Wood Buffalo Park).

Moose. *Alces americana* Clinton.

**Diagnosis.** Male about 9 to 10 feet (2.7-3 metres) long, tail 2 to 3 inches (50-76 mm), height at shoulders about 6 feet (1.6 metres). Female somewhat smaller, male with deciduous antlers (usually none in females), antlers spreading outwards, upwards and backwards with a broad flat palm bearing points along its outer and forward margin; the largest trophy of the Canada moose listed in "North American Big Game" came from Peace River, Alberta. It had a spread of 73 inches; the right palmation measured 37½ by 12½ inches; fourteen points were on the right antler and fifteen on the left; a pendant 'bell' of skin on throat; very variable as to size; muzzle broad and inflated, shoulders higher than hips.

The coloration is generally blackish, with pale legs and head; young (half) reddish brown, not spotted.

**Geographical Variation.** Three subspecies are recognized in North America and the Alberta mammals are referable to *Alces americana americana* Clinton.

**Distribution in Alberta.** The coniferous forests of the north, the west, and the southwest.

**Life History.** Antlers shed in the winter and grown again in the spring and summer. Mate in the autumn, 1 sometimes 2 young born in the spring, food largely browse (leaves and twigs) with some grasses and herbs and some aquatic plants.

**General.** The moose is an animal of the coniferous forests where it usually lives in solitude. At dusk and at early morning it can be seen out in the meadows, swamps, and bogs of the valley, out in browsing on the twigs and leaves of the willows and dwarf bushes. In the summer it may be seen and nearby submerged in some lake at intervals, lifting its head up over water to gather the aquatic orbage that constitutes part of its diet.

The animal is important to the wilderness dwellers as well as being an important game animal.

#### Reference

Merril 1914. The Moose Book. Dutton & Co.

#### Barren-ground Caribou. *Rangifer arcticus* Richardson.

(I usually called "Deer" in the north.)

**Dimensions.** Total length up to about 8½ feet (1.9 metres); tail about 6 inches (152 mm); height at shoulder about 46 inches (1.1 metres); weight with entrails removed 90-130 pounds (males Richardson); male with large, female with small antlers; antlers with slender beam round in cross-section with small palmations. The antlers consist of a main beam that sweeps backward outward and then forward brow lines (one often aborted) projecting over the face; a pair of forward projecting bezel lines above the brow lines; colour in summer olive brown mingled with deep reddish and yel. with brown; the under surface of neck and the belly white, in late winter becomes dirty white by wear and fading (Richardson); neck and rump patch whitish band of white on foot above hoof.

The characters that separate the three caribou in Alberta are not well worked out. In general the barren-ground caribou is a pale-coloured, small animal with (in

the male) long slender antlers (females usually with small antlers), and migrates southward from the barrens in some winters into northern Alberta. The western woodland caribou is a larger darker animal with (in the male) shorter heavier, and more palmate antlers (females often lacking antlers), and is a resident in northern Alberta, the mountain caribou is still larger and darker with straight heavy antlers in the male. Female usually without antlers, resident of the Rocky Mountains.

**Geographical Variation.** The form that occurs in Alberta is

(1) *Rangifer arcticus arcticus* Richardson, to which the above diagnosis applies.

**Distribution in Alberta.** Occasionally comes southward from the barrens into Wood Buffalo Park in winter.

**Life History.** Migrate southward in winter, mate in the autumn, usually 1 young born in the spring, food, lichens, grasses, herbs, and browse.

**General.** The usual summer home of the barren-ground caribou is farther north than Alberta, on the barren grounds of the Northwest Territories. In late autumn and early winter they begin to wander southward in immense bands. That this movement is true migration has been questioned as the herds are said to wander irregularly and the course taken by them is not necessarily the same each year. They used to come as far south in Alberta as Fort McMurray some years but in recent years they are recorded only in the extreme northeast corner of Wood Buffalo Park where Soper reports they prefer rugged rock and moss country with sparse timber and many openings.

#### References

- Soper 1943 Jour. Mammal., 22, p. 143 (occurrence Alberta)  
 Peble, 1908 No. Amer. Fauna, No. 27 (occurrence in Alberta)

#### Woodland Caribou. *Rangifer caribou* Omelin

**Diagnosis.** Male, total length of skull 417 mm. (16.4 in.), greatest orbital breadth 163 mm. (6.2 in.) (western form, Hollister), a darker, larger animal than the barren-



ground caribou but with antlers shorter, less sweeping, and the beams tending to be flat in cross-section rather than round, and with heavier palmations. Females occasionally have small antlers. Colour of body dark brown, neck whitish, band just above hoofs and area on buttocks white, tail dark.

*Geographical Variation.* The Alberta form is (1) *Rangifer caribou sylvestris* Richardson.

*Distribution in Alberta.* The northern part of the province.

*Life History.* Probably mate in the autumn and 1 young born in the spring, food, lichens, grasses, herbs, and some browse.

General Soper writes that the woodland caribou formerly ranged throughout Wood Buffalo Park but by 1934 they were very scarce or entirely absent from the eastern and southern part. Though this species is usually considered non-migratory, Soper writes that in this area there is a westward withdrawal for the summer to the Caribou Mountains Highlands, and a spreading out over the adjacent forested plains after the freeze-up.

#### Reference

Soper 1942. *Four Mammals*, 23, p. 142 (occurrence, Alberta).

#### Mountain Caribou. *Rangifer fortitudo* Hollister

*Diagnosis.* Total length 2,370 mm (90.2 in.), tail 150 mm (5.9 in.), hind foot 600 mm (27.1 in.), (adult male). Male with large stout antlers, main ascending beam rather straight, without the low sweeping backward curve of the barren-ground caribou, less slender and more palmate, apparently the females are normally without antlers. Colour of type: head backish brown, neck greyish brown with a small white throat tuft, body brownish black, legs brownish black, feet broadly white above hoofs, rump patch small, white, tail like back above, bordered with white, July adult in old pelage (above largely from Hollister).

This is apparently the largest and darkest of our caribou.

**Geographical Variation.** This form is probably closely related to *R. montanus* of Brit. Columbia. Anderson includes them in the species *R. arcticus*, the barren-ground caribou, but it is very probable that they are closely related to *R. canadensis*, the woodland caribou. For the present it seems advisable to keep them as separate species.

**Distribution in Alberta.** *Tamias l. sibiricus* in the Jasper area occasionally south to near Banff.

**General.** This is an alpine species whose home is in the Rocky Mountains where stunted fir trees give way to grassland.

#### FAMILY - ANTILOPIDAE - PRONGHORNS

This family has only a single surviving member, the pronghorn antelope of western North America. In earlier geological times, in the Miocene, Pliocene, and Pleistocene, this family was represented by a host of species, all in North America. It can be considered truly American for no fossil members have been found outside the western hemisphere (Scott).

The pronghorn occupies a very isolated biological position, and the distinctiveness is most easily seen in the character of the horns. They consist of a heavy, unbranched horn core and a branched, deciduous, long sheath that is shed and renewed annually. The new horn as well formed beneath the old one before shedding occurs, so that the animal is never completely hornless. In this they stand part way between the horned animals in which the horn sheath is unbranched and persistent and the deer, in which the antler is formed and shed but is solid without any horn core; however, they are more closely related to the Bovidae (ox family) than the Cervidae (deer family) in skeletal characters.

The pronghorn is a prairie animal, adapted for speed, and the foot is so far modified by evolution for this that the dew claws have disappeared.

The young, usually 2 in number, are born in an advanced condition, active soon after birth and able to follow their parents.

**Pronghorn Antelope.** *Antilocapra americana* Ord

(Also called Antelope, American Antelope, Pronghorn)

**Dimensions.** Height at shoulder about 30 to 35 inches (750-902 mm). Tail very trim, and slender with smooth coat. Horns with conspicuous ridges with one branch (males) with very small horns. The record head for APs is has a length of 17½ inches measured along the outside curve of the right horn and a greatest spread of horns of 13½ inches and a tip to tip measurement of 7½ inches (only at all). Colour generally tawny brown above, white below with a pattern of tawny white bars on the throat, the white extending far up the flanks and a conspicuous white rump patch on the inside side of the hind leg and the top of the neck is some dark brown.

The young are not spotted.

**Geographical Distribution.** The subspecies in Alberta is *Antilocapra americana americana* Ord.

**Distribution in Alberta.** The southern plains, formerly north to about North Saskatchewan River, now to somewhat north of South Saskatchewan River.

**Life History.** An animal of the plains, makes local migrations. Mates in late autumn or early winter. 2 young, usually born the following spring, feed chiefly grasses and herbs.

**General.** The pronghorn antelope is an animal of the open plains. In spring and summer they wander about singly or in small groups. In the autumn with the first snow they gather together in bands and some of them undertake short migrations to favourite wintering places. The Suffield area and the Watrous area are two notable wintering areas where thousands of antelope may be seen in a day in the winter.

The antelope is probably our fleetest animal about. People who drive the prairie roads say that they have commonly paced it by automobile at 45 miles an hour. Strangely the antelope does not always flee from an approaching car, it may race alongside it or gallop on a converging route and then cross in front of the automobile. After going some distance at top speed, it may stop and turn around to watch the intruder.

Often, as one is crossing the plains, the first information one has of the antelope is the flashing of their conspicuous white rump patches. Open unfenced country is the antelope's home, where its mammalian neighbors are the badger, prairie ground squirrels, and coyotes. But it has learned to pass fences, not by jumping them but by crawling through them. An antelope at full speed seems to hardly pause when it comes to an ordinary three strand barbed wire fence but seems to slide through and continue with hardly a check.

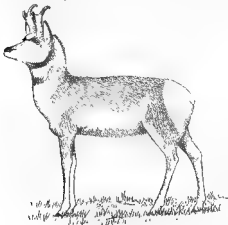


Figure 38. Pronghorn antelope

In the early days antelope were probably as abundant as the buffalo. They were said to cover the prairie like bands of sheep and to migrate in immense bands, that were followed by Indian hunters who were living on them.

The antelope was almost exterminated in Canada by the hard winter of 1906. Its recovery was very slow, by 1924 Nelson estimated only 1,030 antelope in Alberta and 297 antelope in Saskatchewan. Since the 1930s the increase has been steady, and in 1945 a survey by the National Museum of Canada showed that there were probably more than 30,000 antelope in the two prairie provinces. A moderate amount of hunting has been possible for some years, and the future of our antelope is bright, unless, or until, another hard winter strikes and wipes them out again.

#### *References*

Nelson 1924 U.S. Dept. Agric. Bull. No. 1348, 84 pp. (status)  
Bond, 1946 Nat. Mus., Canada Bul. 103 (status in Canada)

#### FAMILY—BOVIDAE

Used in a broad sense this family includes cattle, bison, sheep, goats, mountain goats, chamois, gazelles, antelope, and many other cloven-hoofed animals that are sometimes put into separate families. Used in this broad sense it is a very large family and its members are probably more numerous than all other hooved animals.

The centre of abundance is in the Old World with a few species in the northern part of North America.

They are herbivorous animals, the young are born in an advanced stage of development and able to follow the parent soon after birth.

Many species are important to man. The family has supplied our domestic cattle and sheep, yielding food (meat, milk, butter and cheese) and clothing (woollen cloth and blue leather). Wild forms in Canada are generally less important than the deer family for food and clothing to wilderness dwellers at the present time though the bison was formerly important to various tribes of plains Indians and the sheep is used to a certain extent. The bighorn sheep and the Rocky Mountain goat are important as game animals. For an account of hunting these animals see Ely et al., 1939, *North American Big Game*, Charles Scribner's Sons, New York.

Three species occur in Alberta.

## KEY TO ALBERTA BOVIDAE

- (1) Pelage entirely white—Rocky Mountain goat (*Oreamnos montanus*)
- (1a) Pelage not white 2
- (2) Colour generally brownish or brownish black—Lion (*Bassaris*)
- (2a) Colour grey or brown with conspicuous rump patch—Rocky Mountain big horn sheep (*Ovis canadensis*)

**Bison. Bison bison LINNAEUS**

(Also called Buffalo)

**Diagnosis.** Bulls: total length 10-12½ feet (3,042-3,803 mm); tail 29-36 inches (507-913 mm); hind foot 23-26 inches (584-661 mm); weight at shoulder 3½-6 feet (1,673-1,825 mm); cows are much smaller (Nettelbladt). Average weight of full-grown bull about 1,800 pounds (Soper). Largest Alberta trophy has a curl of extreme curve of right horn of 194 inches with circumference at base of 13½ inches (half of all females much smaller). Horns rising sideways and upwards and curving inward as in all animals; old males especially with short horns much higher than the smaller. The head carried low. Pelage on head neck and shoulders very much longer than on rest of body, but with a tuft of long hair at tip, and generally dark brown to black or brown, especially light yellowish or reddish brown.

**Geographical Variation.** Originally two subspecies occurred in Alberta. The plains form *Bison bison bison*, and a larger darker subspecies with more slender more incurving horns (Allen) *Bison bison athabascus* Rhoads. The only two at large in Alberta are in Wood Buffalo Park and represent a small remnant of the original wood bison with a much larger admixture of the imported plains bison.

**Distribution in Alberta.** At large only in Wood Buffalo Park; several hundred are under fence in Elk Island Park.

**Life History.** Breed in late summer or early autumn, 1 young born the following spring, feed largely grasses and sedges (Soper).

**General.** Up until the final third of the last century bison were present in large numbers on our plains. By 1900 there were only two herds of bison in a wild state in the world, one in Yellowstone Park, and one in Wood Buffalo Park. A large protected herd of plains bison was kept at Wannwright. It was started in 1907 and 1909 with animals purchased from Don Michel Pablo of Montana, consisting of 709 head. By 1920 there were about 5,000 animals on this 160 square mile, fenced park (Hewitt). In Wood Buffalo Park in 1922 there were about 1,500 to 2,000 wood bison (Soper). In the 4 year period beginning in 1925, 6,673 plains bison from the Wannwright herd were shipped to Wood Buffalo Park. In 1934 Soper estimated there were about 12,000 head of bison in this latter preserve, and in 1945 about 20,000 animals.

At the present time in Elk Island Park, within 30 miles of Edmonton it is possible to see herds of bison living in a semi-wild state on the enclosed range of mixed aspen and meadows.

As set forth under the heading "Geographical Variation" the wood bison is a large, darker northern representative of the plains bison, a different subspecies.

There is an European animal, the European bison or wisent, that is the Old World representative of our bison, and is very similar to it. It is on the verge of extermination.

#### References

- Allen, 1836. The American bison, living and extinct, *Mém. Mus. Comp. Zool.*, vol. 4, LX+266 pp.
- Allen, 1877. 8th Report U.S. Geol. and Geogr. Survey Terr., pp. 444-587 (history of bison).
- Hewitt, 1921. The Conservation of the Wildlife in Canada. New York.
- Hornaday, 1889. Ann. Rept. U.S. Nat. Mus. for 1887, pp. 387-648 (discovery, life history, and extermination).
- Soper, 1941. *Zool. Monographs* 11, pp. 349-412 (history, range, and home life of the northern bison).

**Rocky Mountain Bighorn Sheep.** *Ovis canadensis Shaw*  
(Also called Bighorn, Rocky Mountain Big Horn, Bighorn  
Sheep, Rocky Mountain Sheep)

**Diagnosis.** Male, total length 1600 mm (62.9 in.), tail 100 mm (3.9 in.), hind foot 440 mm (17.3 in.), ear from notch 100 mm (3.9 in.) (Alberta male, Cowan). Weight males 285-344 pounds (Cowan). The record Alberta head with a length of front curve of right horn of 46½ inches and a circumference at base of 15½ inches and greatest spread of 23 inches is the second largest trophy noted (Fly et al.), female much smaller, body stout, legs slender, coat close and smooth. Males with very large, massive, curled horns that sweep upwards and backwards, and then curl around until the point comes in front of the eye. This point is usually kept broken off by the animal. Female with much smaller, more slender horns that sweep upwards and backwards.

Colour generally greyish brown with large, conspicuous whitish rump patch surrounding the dark brown tail.

**Geographical Variation.** Cowan in his excellent monograph shows that all the mountain sheep in North America are referable to two species, the northern thin-horned sheep of Alaska, Yukon and north British Columbia, and the present species embraces all the many forms south of that. The Alberta form is *Ovis canadensis canadensis Shaw*.

**Distribution in Alberta.** Common in the Rocky Mountains.

**Life History.** Drurnal, mate in the autumn, 1 young born the following spring after a gestation period of 180 days (Spencer), food, grasses, sedges, herbs, and some browse.

**General.** The sheep is a grazing animal of the mountain slopes. As with many mountain animals, the bighorn in Alberta has a seasonal altitudinal migration. In summer they feed high up near timberline though even then they may come down to salt-licks in the valley bottoms.



Just north of Banff, on the Banff-Jasper highway is one such place where sheep may be seen all summer along the road. In autumn, winter, and spring most of the sheep come down low into the valleys.

The sheep are promiscuous in their breeding habits. Old males fight ferocely amongst themselves. They face each other, from 10 to 40 feet apart, then dash at each other, head-on, meeting with a resounding crash.

Closely related species of mountain sheep live in Asia.

#### References

- Cowan, 1940 Amer Midl Nat., 24 pp 535-580 (taxonomic monograph)  
 Spencer, 1943 Jour of Mammal., 24, pp 1-11 (life history Colorado)

#### Rocky Mountain Goat. *Oreamnos americanus* Blainville

**Diagnosis.** Total length 57-66 in. (1,425-1,650 mm.), tail 6-8 in. (150-200 mm.) height at shoulder 36-43 in. (900-1,075 mm.) (Grant) weight 150-300, and even 400 pounds (Grant), male and female with sharp, slender black horns that rise upward and slightly backward, record head for Alberta has the front curve of right horn 10½ inches (Ely et al.), legs short, shape bulky, shoulders high, fur shaggy, extending part way down the legs males with "beard", colour white, with black horns and muzzle patch.

The shape, the colour and the slender spike horns are distinctive.

**Geographical Variation.** The subspecies found in Alberta is *Oreamnos americanus americanus* Blainville.

#### Distribution in Alberta. The Rocky Mountains.

**Life History.** Breeds in the autumn, 1 or 2 young born in the spring, gestation period 147 days (Kenneth); food, herbs, twigs, and some grasses (Grant).

**General.** The Rocky Mountain goat's favourite habitat includes the roughest most broken rocky terrain in the mountains. And here on great cliffs it prowls about sure-footedly on narrow ledges and steep faces that makes a human beholder wonder how the goat can possibly find

his way. The goat does not skip about from ledge to ledge but it slowly and carefully walks and crawls, looking carefully about before making a move, always moving cautiously, and in difficult places sometimes having to make detours and even to retrace his steps.

He is a clumsy-looking, slow-moving, powerful animal, without the quick agility of the mountain sheep, and never ventures far from the broken rocky fastnesses where he can easily out-distance his enemies.

Sometimes, as though tired of such rugged rocks, the goats move out onto nearby meadows or grassy and brushy benches to feed and lie down.

It is sometimes alleged that goats and sheep have an antipathy toward each other, and where you find one you will not find the other. It is true that goats and sheep prefer different habitats, and consequently are not usually found together, but this is a question of habitat selection, not mutual antipathy, and they sometimes occur on the same mountains.

Vernacular names often do not express relationships well, and that is the case with this animal. It is a member of the family Bovidae, that includes the sheep, goats, cattle, antelope, etc., but its nearest relatives are a number of Old World animals that are sometimes called mountain antelope, and include such animals as the chamois of Europe and Asia, and the goral and serow of Asia.

#### Reference

Grant, 1906. Ninth Ann. Report New York Zool. Soc., 1904 (general.)

## REFERENCES

Below are listed some of the more important publications dealing with mammals. Although some are out of print they are as far as available to book dealers.

- Fauna of the United States Mammals** by W. H. Henshaw, with the Major species illustrated by G. M. Allen. 829 pages. American Committee for Protection and Wildlife Protection Special Publication No. 1. 1942. Contains a series of letters on the acquisition and collection of mammals.
- Catalogue of the Mammals of Canada** by R. M. Anderson. 338 pages. National Museum of Canada Bull. No. 163. 1940. A list of the species and their distribution.
- Field Book of North American Mammals** by H. F. Anthony. 625 pages. G. P. Putnam's Sons. New York-London. 1928. Illustrated descriptive catalog and key.
- Mammals of the United States** 805 pages. McGraw-Hill Company. 1902. A general survey of mammals of the world. One of the Cambridge Natural History series.
- North American Mammals** by Alfred Rehn. 543 pages. Charles Scribner's Sons. 1929. Includes illustrations of habits etc. and chapter on the making of a mammal collection. Index of record trophies and their measurements.
- An Introduction to the Study of Mammals: Living and Extinct**, by W. H. Flower and Richard Lydekker. 743 pages. Adam and Charles Black. 1891. Though old, this is still an extremely useful text book.
- American Mammals: Their Lives, Habits and Economic Relations** by W. J. Henshaw. 431 pages. McGraw-Hill Book Company, Inc. 1939. A survey for the biologist and mammalogist.
- Economic Mammalogy** by James Henshaw and Edward J. Craig. 267 pages. Charles C. Thomas. 1932. Discusses the value of other mammals to man from many viewpoints with numerous references.
- The Conservation of the Wild Life of Canada** by C. Gordon Hew. 244 pages. Charles Scribner's Sons. 1921. Contains much interesting mammal data.
- Wild Animals of North America** In many stories of big and little animals of the Mammal Kingdom by F. W. Nelson. National Geographic Society. Edited by Louis Agassiz Fuertes. Track sketches by Forest Thompson Nelson. 254 pages. National Geographic Society. Washington. 1930. Accounts and colour pictures of many species.



Notes on some Mammals of the southern Canadian Rocky Mountains, by Peter E. Crowe, *Bull Amer Mus Nat Hist*, 80 pp. 29c. 4.0 (.943)

Current research on mammals is published in the *Journal of Mammalogy* now (1946) in its 27th year, and put out quarterly by the American Society of Mammalogists, and the *Canadian Field-Naturalist* now in its 90th year, and published by the Ottawa Field Naturalists Club. Ottawa runs papers on mammals. Both expect to publish articles on the mammals of Alberta shortly.



# Index to Family, Generic, Specific, Subspecific, and English Names

<i>asticticola</i> , <i>Mustela</i>	82
<i>astutissima</i> , <i>Mustela</i>	82
<i>aberti</i> , <i>Vulpes</i>	105
<i>actaea</i> , <i>Mustela</i>	82
<i>alascensis</i> , <i>Myotis</i>	59
<i>Aloes americanus</i>	210
<i>Alopes uratus</i>	100
<i>lagopus</i>	108
<i>alpinus</i> , <i>Glaucomyx</i>	147
<i>americana</i> , <i>Antilocapra</i>	215
<i>Mustela</i>	81
<i>americanus</i> , <i>Aloes</i>	210
<i>Lepus</i>	198
<i>Oreamnos</i>	221
<i>Ursus</i>	70
<i>andersoni</i> , <i>Hyalomys</i>	141
<i>andersoni</i> , <i>Thomomys</i>	149
<i>Antelope</i> , pronghorn	215
<i>Antilocapra americana</i>	215
<i>Antilocapridae</i>	214
<i>arcticus</i> , <i>Rangifer</i>	251
<i>Sorex</i>	80
<i>arcticus</i> , <i>Peromyscus</i>	161
<i>athabascan</i> , <i>Bison</i>	218
<i>Clethrionomys</i>	172
<b>Badger</b>	100
<i>bairdi</i> , <i>Lepus</i>	199
<i>bairdi</i> , <i>Glaucomyx</i>	147
<b>Bat</b> , big brown	62
big-eared	60
hoary	64
hoop	69
little brown	58
long-legged	61
red	64
roy. masked	62
silver-haired	62
<b>Bats</b>	62
<b>Bear</b> black	70
brown	70
grizzly	74
<b>Beaver</b>	69
<b>Beavers</b>	153
<b>Bison</b>	218
<i>athabascan</i>	218
<i>bairdi</i>	218
<b>Bison</b> , <i>Bison</i>	218

<b>boralia, Eutamias</b>	140
<i>leucurus</i>	84
<i>procaryneus</i>	150
<i>synaptomys</i>	167
<b>Davidae</b>	217
<b>Buffalo</b> See <i>Bison</i>	
<b>canis, Marmota</b>	129
<b>canadensis, Castor</b>	153
<i>canis</i>	208
<i>lutra</i>	96
<i>lynx</i>	110
<i>Marmota</i>	128
<i>Oryz</i>	220
<i>Ursus</i>	75
<b>Canidae</b>	108
<b>Canis columbianus</b>	113
<i>moelatus</i>	140
<i>reclinatus</i>	113
<i>knights</i>	112
<i>latrans</i>	108
<i>leotis</i>	110
<i>lepus</i>	112
<i>nebrascensis</i>	110
<i>occidentalis</i>	112
<b>Caribou</b>	211
barren-ground	211
mountain	213
woodland	212
<b>car-bou, Rangifer</b>	212
<b>Castor canadensis</b>	153
<i>missouricenis</i>	154
<b>Castoridae</b>	153
<b>Cat, bob</b>	121
<i>bob</i>	121
<i>lynx</i>	121
<b>Cats</b>	117
<b>Cervidae</b>	203
<b>Cervus canadensis</b>	206
<i>canis</i>	207
<b>chapman, Synaptomys</b>	167
<b>Chapmunk, a. lea</b>	141
<i>leu</i>	130
<i>leu</i>	139
<i>rufous-tailed</i>	143
<b>cinea, Neotoma</b>	162
<b>cineus, Leucurus</b>	64
<i>Bore</i>	48
<b>cinnamomeus, Ondatra</b>	180
<b>cinnamomeum, Ursus</b>	71
<b>Citellus columbianus</b>	132
<i>franklini</i>	134
<i>interius</i>	130
<i>pallidus</i>	138



<i>ne-ardsoni</i>	135
<i>tennensi</i>	131
<i>indicoemineus</i>	137
<i>Clathronotus albidus</i>	172
<i>gambelii</i>	172
<i>gambelii</i>	171
<i>loraini</i>	172
<i>californicus</i>	172
<i>californicus</i> , <i>Martes</i>	84
<i>californicus</i> , <i>Citellus</i>	118
<i>californicus</i>	132
<i>californicus</i> , <i>Lepus</i>	190
<i>californicus</i> , <i>Tamias</i>	144
<i>californicus</i> , <i>Lepus</i>	201
<i>californicus</i> , <i>Felis</i>	117
<i>californicus</i>	117
<i>californicus</i>	100
<i>californicus</i>	156
<i>californicus</i> , <i>Lemmus</i>	179
<i>californicus</i> , <i>Lepus</i>	130
<i>californicus</i> , <i>Odocoileus</i>	206
<i>Deer</i>	203
<i>Deer</i>	206
<i>Deer</i>	206
<i>Dipodomys ordii</i>	152
<i>Deer</i>	152
<i>Dog, black-tailed prairie</i>	159
<i>Dog</i>	152
<i>Deer</i> , <i>Lepus</i>	190
<i>Deer</i> , <i>Microtus</i>	173
<i>Deer</i> , <i>Neotoma</i>	152
<i>Deer</i> , <i>Ursus</i>	75
<i>Elk</i>	206
<i>Elk</i> , <i>Mustela</i>	60
<i>Elk</i> , <i>Lepus</i>	191
<i>Elk</i> , <i>Lepus</i>	68
<i>Elk</i> , <i>Lepus</i>	190
<i>Elk</i>	191
<i>Elk</i>	191
<i>Elk</i>	191
<i>Elk</i>	190
<i>Elk</i> , <i>Mustela</i>	60
<i>Elk</i> , <i>Neotoma</i>	141
<i>Elk</i>	140
<i>Elk</i> , <i>Neotoma</i>	142
<i>Elk</i> , <i>Neotoma</i>	142
<i>Elk</i>	139
<i>Elk</i>	140
<i>Elk</i>	142
<i>Elk</i> , <i>Myotis</i>	60

<i>faustianus</i> , <i>Perognathus</i>	151
Felidae	1, 7
<i>Felis concolor</i>	1, 7
<i>marulorum</i>	118
Ferret, black-footed	80
Fisher	84
<i>Fertidea</i> , <i>Rangifer</i>	213
Fox, arctic	108
kit	107
pawie	107
red	104
Franklin, <i>Citellus</i>	134
<i>frontata</i> , <i>Muscula</i>	89
<i>fulva</i> , <i>Vulpes</i>	104
<i>fuscus</i> , <i>Hydrotus</i>	83
<i>galei</i> , <i>Clethrionomys</i>	172
<i>gapperi</i> , <i>Clethrionomys</i>	171
<i>Gemmyidae</i>	148
<i>Gleucomys niparvus</i>	147
<i>longus</i>	147
<i>sabrinus</i>	146
Goat, Rocky Mountain	221
<i>Gopher</i>	148
<i>montanus</i>	132
<i>parkii</i>	149
red	132
<i>grangeri</i> , <i>Sylvilagus</i>	209
Groundhog	127
<i>Gulo luscus</i>	94
Hare, snowshoe	188
<i>varying</i>	188
Hares	187
<i>haydeni</i> , <i>Sorex</i>	48
<i>hobbsi</i> , <i>Vulpes</i>	107
<i>holwelli</i> , <i>Lemmus</i>	188
<i>humilis</i> , <i>Odocoileus</i>	209
<i>Heteromyidae</i>	151
<i>hustus</i> , <i>Procyon</i>	76
<i>horridus</i> , <i>Urocyon</i>	74
<i>hoyi</i> , <i>Marmosorex</i>	84
<i>hudsonica</i> , <i>Mephitis</i>	98
<i>hudsonius</i> , <i>Tamiasciurus</i>	144
<i>Zapus</i>	188
<i>hylocaustus</i> , <i>Urocyon</i>	75
<i>idahoensis</i> , <i>Zapus</i>	189
<i>imperator</i> , <i>Urocyon</i>	75
<i>imperator</i> , <i>Urocyon</i>	75
<i>incolatus</i> , <i>Canis</i>	110
<i>innatus</i> , <i>Alopex</i>	189
<i>isoperatus</i> , <i>Microtus</i>	173
<i>intermedius</i> , <i>Thomomys</i>	189
<i>intervetus</i> , <i>Mitranorex</i>	84

inviola, <i>Mustela</i>	88
irremotus, <i>Canis</i>	.13
knights, <i>Canis</i>	.12
keoni, <i>Myotis</i>	59
klumbe, <i>Urocyon</i>	75
kruska, <i>Mustela</i>	89
lappas, <i>Alces</i>	108
latifrons, <i>Urocyon</i>	75
<i>Laononycteris noctivagans</i>	62
<i>Lasiurus borealis</i>	64
caucasicus	64
lateris, <i>Citellus</i>	130
latrans, <i>Canis</i>	109
Lemming, brown	165
northern bog	167
Lemmings	.64
<i>Lemmus euratus</i>	179
pallidus	179
<i>Lemmus leucurus</i>	168
transmontanus	168
Leopardus	197
<i>Lepus americanus</i>	.88
bard	199
canadensis	199
compansus	201
maculatus	198
townsendi	201
leste, <i>Canis</i>	110
<i>Leucogaster, Onychomys</i>	158
leucopus, <i>Peromyscus</i>	161
levis, <i>Ochetona</i>	195
Phenacomys	170
longicauda, <i>Mustela</i>	89
longicauda, <i>Microtus</i>	174
longerus, <i>Myotis</i>	61
loringi, <i>Clethrionomys</i>	.72
Thomomys	.49
lotor, <i>Procyon</i>	76
lucifugus, <i>Myotis</i>	58
ladibundus, <i>Eutamias</i>	142
ludovicianus, <i>Cynomys</i>	139
lupus, <i>Canis</i>	112
luscus, <i>Gulo</i>	94
luteiventris, <i>Eutamias</i>	142
lutescens, <i>Ochetona</i>	195
<i>Lutra canadensis</i>	96
preben	96
Lynx	.19
canadensis	119
pallidus	122
rufus	.2.

<i>macfarlandi</i> , <i>Lepus</i>	156
<i>mackenzii</i> , <i>Phenacomys</i>	170
<i>macrocha</i> , <i>Vulpes</i>	165
<i>maculatus</i> , <i>Peromyscus</i>	130
Marmot, hoary	129
<i>Marmota caligata</i>	128
<i>canadensis</i>	28
<i>flaviventris</i>	127
<i>obsoleta</i>	130
<i>oxleyana</i>	129
<i>s. varia</i>	129
Martes	81
<i>Martes americana</i>	81
<i>americanus</i>	82
<i>americanus</i>	82
<i>americanus</i>	81
<i>americanus</i>	84
<i>americanus</i>	84
<i>Mephitis mephitis</i>	98
<i>mephitis</i>	98
<i>Mephitis</i> , <i>Mephitis</i>	98
<i>Microtus agilis</i>	54
<i>intercedens</i>	54
<i>Microtus drummond</i>	173
<i>montanus</i>	173
<i>longicaudus</i>	174
<i>montanus</i>	175
<i>permyioides</i>	175
<i>richardsoni</i>	177
<i>velox</i>	176
<i>xanthognathus</i>	175
<i>Microtus</i> , <i>Peromyscus</i>	139
Mink	90
<i>minor</i> , <i>Peromyscus</i>	177
<i>Zapus</i>	89
<i>montanus</i> , <i>Felis</i>	118
<i>montanus</i> , <i>Castor</i>	154
<i>Onychomys</i>	158
<i>montanus</i> , <i>Marinus</i>	127
<i>montanus</i> , <i>Rangifer</i>	214
<i>Monte</i>	210
<i>montanus</i> , <i>Microtus</i>	175
<i>Mus</i> , deer	140
<i>gracilis</i>	148
<i>house</i>	185
<i>meadow jumping</i>	188
<i>pocket</i>	151
<i>red-backed</i>	171
<i>Rocky Mountain jumping</i>	189
<i>white-footed</i>	181
<i>Muridae</i>	183
<i>musculus</i> , <i>Mus</i>	185
<i>Muskrat</i>	180

<i>Mus musculus</i>	185
<i>Mustela ermineus</i>	90
<i>erminea</i>	88
<i>franka</i>	89
<i>myiata</i>	88
<i>laxetra</i>	90
<i>longicauda</i>	89
<i>nigripes</i>	93
<i>richardsoni</i>	88
<i>rissoni</i>	89
<i>vixax</i>	90
<i>Mustelidae</i>	79
<i>Myops, Erethizon</i>	191
<i>Myotis silvestris</i>	59
<i>callosus</i>	60
<i>kenii</i>	59
<i>longipes</i>	61
<i>lucifugus</i>	58
<i>pacificus</i>	60
<i>permyi</i>	59
<i>subulatus</i>	62
<i>volans</i>	61
<i>Nangpior, Sorex</i>	52
<i>nebrascensis, Canis</i>	119
<i>nelsoni, Cervus</i>	207
<i>Nesotoma cinerea</i>	162
<i>drummond</i>	62
<i>nigrescens, Erethizon</i>	191
<i>nigripes, Mustela</i>	93
<i>novae, Marmota</i>	129
<i>noct-vagans, Lasioryctes</i>	62
<i>norvegicus, Rattus</i>	184
<i>nuttalli, Sylvilagus</i>	202
<i>obscurus, Sorex</i>	52
<i>occidentalis, Canis</i>	112
<i>Ochotona levis</i>	196
<i>lutescens</i>	195
<i>princeps</i>	195
<i>Ochotonidae</i>	194
<i>ochrotus, Odocoileus</i>	208
<i>Odocoileus dacotinus</i>	208
<i>hemionus</i>	209
<i>schroterus</i>	208
<i>virginianus</i>	208
<i>okanagana, Marmota</i>	130
<i>Ondatra canadensis</i>	180
<i>spatulata</i>	180
<i>sibirica</i>	180
<i>Onychomys leucogaster</i>	158
<i>mussonensis</i>	158
<i>ordin, Dipodomys</i>	152
<i>Oreortyx americanus</i>	221
<i>oreocetes, Eutamias</i>	140

ongoodi Peromyscus	.00
Otter	.98
Oryz. canadensis	220
oxytona Marmota	128
padulus, Myotis	60
pallidus, Lynx	122
palidus, Citellus	138
Lemmus	178
palustris, Sorex	82
Peromyscus truei	177
pennanti Martes	84
pennsylvanicus, Microtus	172
pernix Myotis	89
Perognathus leucotis	.5.
Peromyscus eridania	161
bairdii	.89
leucopus	161
maniculatus	.90
ongoodi	.60
Phocaenys intermedium	169
levis	.78
montana	178
ungava	178
Puma	194
Putorius, Canadian	.90
preblei, Lutra	86
Tartarus	144
princeps, Odocoileus	185
Zapus	189
Procyon erici	76
lotar	76
Procyonidae	76
Pronghorn	214
Rabbit, cottontail	202
snowshoe	198
white-tailed jack	201
Rabbits	197
Raccoon	78
Rangifer arcticus	2.1
caribou	212
fortis	2.3
montanus	2.4
syvestris	212
Rat, brown	184
bushy-tailed wood rat	162
kangaroo	.82
puck	102
Rats	.5.
Old World	.82
Rattus norvegicus	184
regalis, Vulpes	105
richardsoni, Microtus	177

<i>Tamias</i>	145
<i>richardsoni</i> , <i>Citellus</i>	135
<i>muskele</i>	88
<i>rissoni</i> , <i>Myiobala</i>	88
<i>ruficauda</i> , <i>Eutamias</i>	143
<i>rufus</i> , <i>Lynx</i>	121
<i>ringrow</i> , <i>L. rex</i>	75
<i>sabrinus</i> , <i>Glaucocorys</i>	146
<i>sabrinus</i> , <i>Chelonomys</i>	172
<i>Saimiri</i>	126
<i>Shoop</i> , <i>highborn</i>	220
<i>Rocky Mountain highborn</i>	220
<i>Shrew cinereus</i>	45
<i>dark</i>	51
<i>pygmy</i>	54
<i>saddle-back</i>	50
<i>water</i>	62
<i>Shrews</i>	45
<i>Squirrels</i>	98
<i>sopori</i> , <i>Sorex</i>	52
<i>Sorex arcticus</i>	50
<i>cinereus</i>	46
<i>haydeni</i>	49
<i>navigator</i>	53
<i>obscurus</i>	51
<i>paustris</i>	52
<i>sopori</i>	52
<i>Sorexidae</i>	45
<i>spatulata</i> , <i>Ondatra</i>	180
<i>Squirrel, columbian ground</i>	132
<i>flyng</i>	146
<i>franklin ground</i>	134
<i>mantled ground</i>	130
<i>red</i>	144
<i>richardson ground</i>	135
<i>thirteen-lined ground</i>	127
<i>Squirrels</i>	126
<i>subulatus</i> , <i>Myotis</i>	62
<i>sylvesteria</i> , <i>Rangifer</i>	213
<i>Sylvagus grangeri</i>	202
<i>vuttalli</i>	202
<i>Synaptomys borealis</i>	167
<i>chapmani</i>	167
<i>talpodes</i> , <i>Thomomys</i>	149
<i>Tamiasciurus columbianus</i>	144
<i>tucsonensis</i>	144
<i>pygma</i>	144
<i>richardsoni</i>	145
<i>Tamias tatus</i>	100
<i>tatus</i> , <i>Taxidea</i>	100
<i>terreus</i> , <i>Dipodomys</i>	152
<i>texanum</i> , <i>Citellus</i>	131

<i>Thomomys andersoni</i>	149
<i>loringi</i>	149
<i>la.pédon</i>	149
<i>townsendi</i> , <i>Lepus</i>	201
<i>indocentri vestus</i> , <i>Ostolus</i>	127
<i>intracranialis</i> , <i>Lefroyus</i>	168
<i>jugosa</i> , <i>Phenacomys</i>	70
<i>l. rosae</i>	69
<i>Urocyon americanus</i>	79
<i>canadensis</i>	75
<i>cinnamomum</i>	71
<i>discolor</i>	75
<i>horribilis</i>	74
<i>hyalodromus</i>	75
<i>imperator</i>	75
<i>unipiger</i>	75
<i>klunze</i>	75
<i>latifrons</i>	75
<i>ringius</i>	75
<i>vellerogus</i> , <i>Microtus</i>	175
<i>velox</i> , <i>Vulpes</i>	167
<i>Vespertilionidae</i>	70
<i>virginianus</i> , <i>Odocoileus</i>	208
<i>vorax</i> , <i>Mustela</i>	160
<i>volans</i> , <i>Myotis</i>	61
<i>Yala</i> , chestnut-checked	175
long-tailed meadow	174
pallid	179
<i>phenacomys</i>	169
<i>richardson</i>	177
short-tailed meadow	173
<i>agrand</i>	177
<i>Yona</i>	164
<i>Vulpes shastorum</i>	168
<i>fulva</i>	164
<i>hides</i>	167
<i>macrurus</i>	165
<i>regalis</i>	165
<i>velox</i>	167
<i>Wapiti</i> See Elk	
<i>Weasel</i> , <i>Must.</i>	55
long-tailed	59
short-tailed	58
<i>Wren</i> +	79
<i>Whistler</i> See Marmot	
<i>Wolf</i> , <i>Canis</i>	112
<i>timax</i>	112
<i>Wolverine</i>	74
<i>Woodchuck</i>	127
<i>xanthognathus</i> , <i>Microtus</i>	175



Zapodidae	188
Zapus hudsonicus	.88
kahoensis	.89
minor	.88
princeps	.89
zibethosa, Ondatra	.80





## DATE DUE SLIP

APR 15 ALIEN

		DOE CAM	APR 05 RETURN
		DOE CAM	APR 27 '79
		DOE CAM	APR 17 '84
		DOE CAM	APR 01 RETURN
		DOE CAM	JAN 31 '85
		DOE CAM	FEB 15 '85
		DOE CAM	MAR 01 '85
		DOE CAM	MAR 01 RETURN
		DOE CAM	DEC 01 '80
		DOE CAM	APR 30 '85
		DOE CAM	NOV 15 RETURN
		DOE CAM	MAR 14 '85
		DOE CAM	APR 25 '85
		DOE CAM	APR 19 RETURN
		DOE CAM	FEB 26 '85
		DOE CAM	NOV 15 '85
		DOE CAM	NOV 08 RETURN
		DOE CAM	MAR 14 RETURN
		DOE CAM	MAR 18 '86

AUG 2

OL 721 R186 C-7

RAND AUSTIN LOOMER 1905-

MAAMALS OF THE EASTERN ROCKIES

AND WESTERN PLAINS OF CANADA

39441154 SCI



-000008160491-

OL 721 R186

C. 7

Rand, Austin Loomer, 1905-

Mammals of the eastern Rockies

and western plains of Canada.

03465298 SCI

c.7

SCIENCE  
CAMERON LIBRARY

